

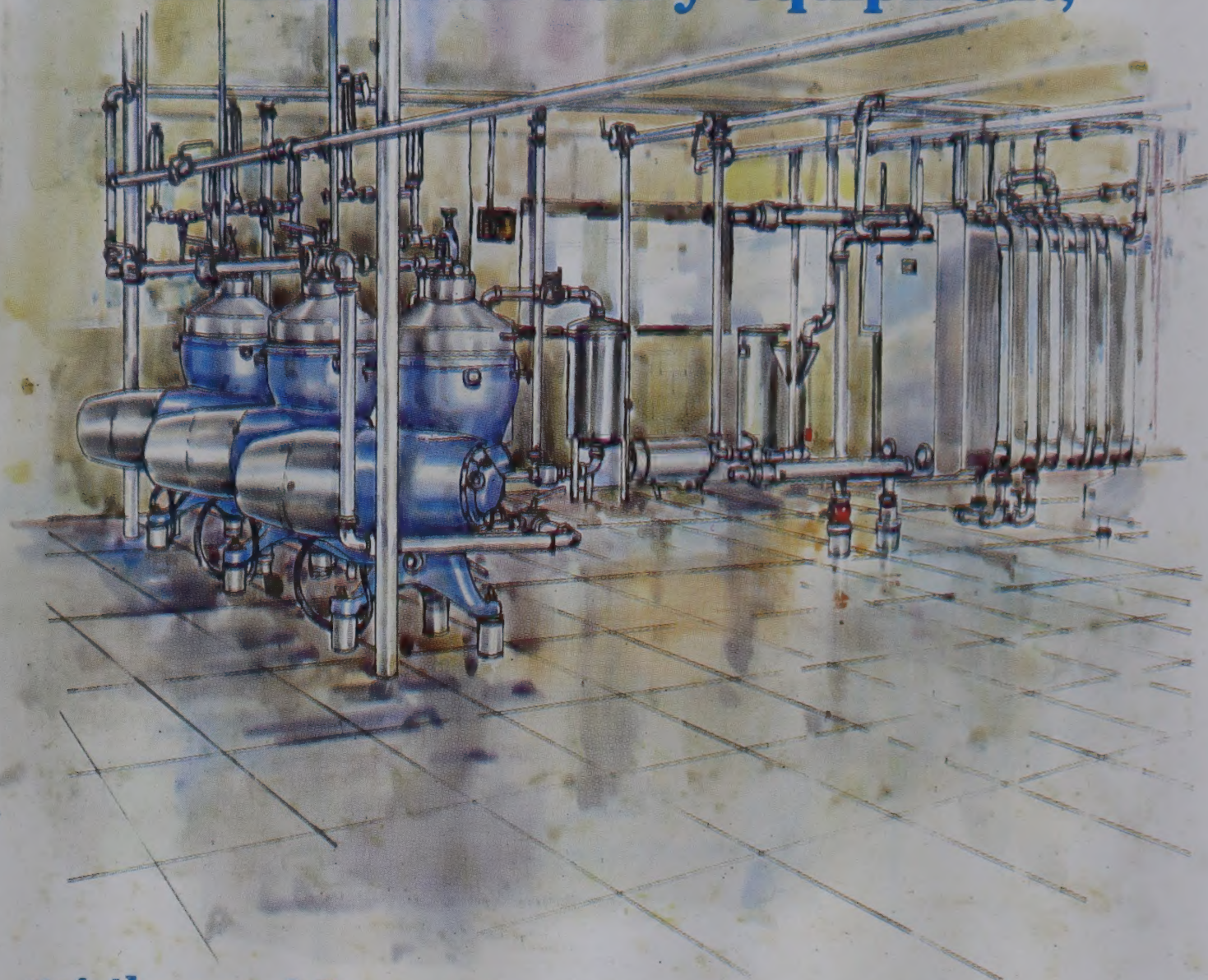
Dairy India

1987

THIRD ANNUAL EDITION



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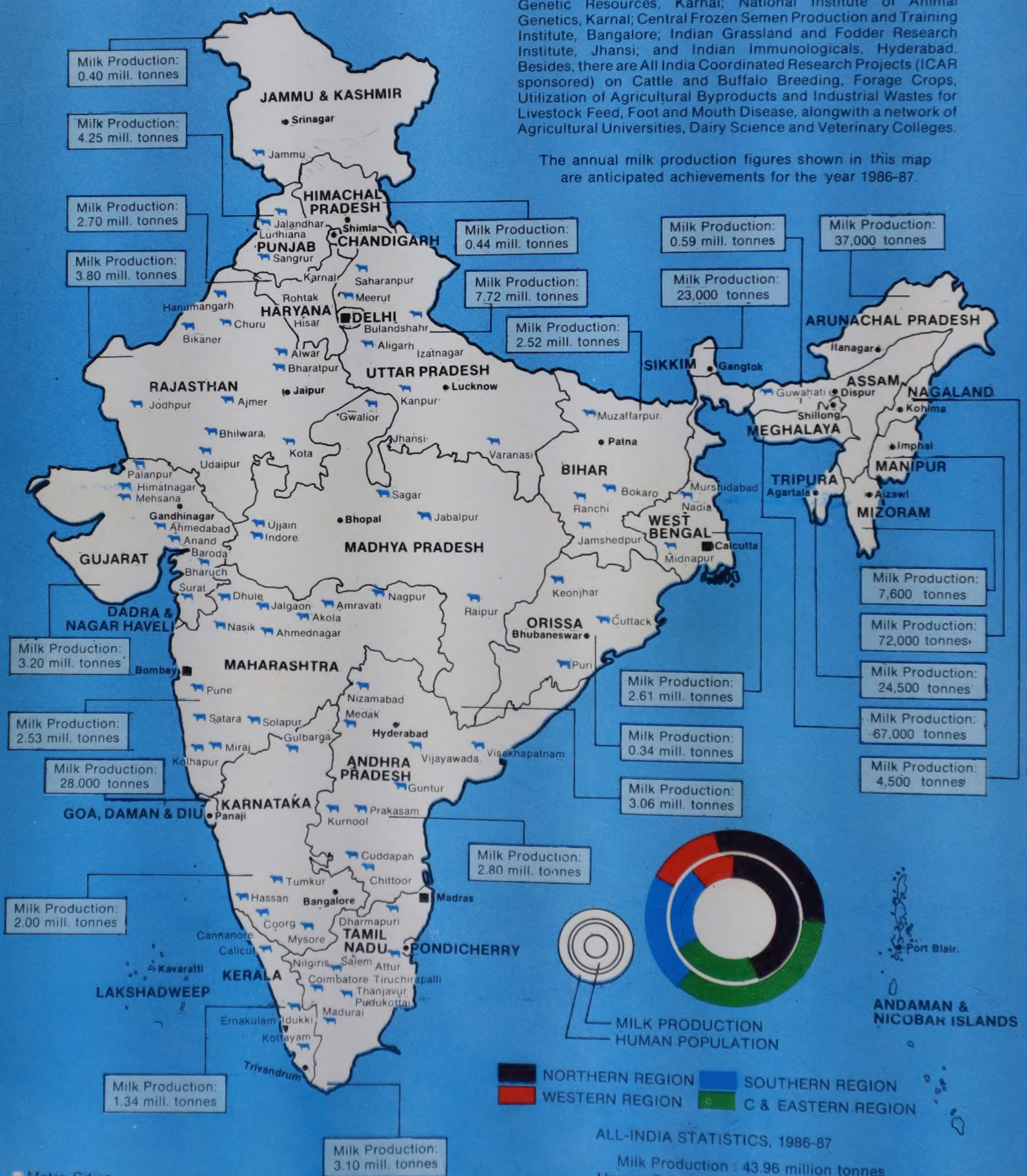
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DAIRY MAP OF INDIA

Places significant to the development of dairying are shown in this map. Not indicated here are: National Dairy Development Board, Anand; Indian Dairy Corporation, Baroda; National Dairy Research Institute, Karnal, Bangalore & Calcutta; Central Institute for Research on Buffaloes, Hisar; Indian Veterinary Research Institute, Izatnagar, UP; National Bureau of Animal Genetic Resources, Karnal; National Institute of Animal Genetics, Karnal; Central Frozen Semen Production and Training Institute, Bangalore; Indian Grassland and Fodder Research Institute, Jhansi; and Indian Immunologicals, Hyderabad. Besides, there are All India Coordinated Research Projects (ICAR sponsored) on Cattle and Buffalo Breeding, Forage Crops, Utilization of Agricultural Byproducts and Industrial Wastes for Livestock Feed, Foot and Mouth Disease, alongwith a network of Agricultural Universities, Dairy Science and Veterinary Colleges.

The annual milk production figures shown in this map are anticipated achievements for the year 1986-87.



Dairy India

1987

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Foreword

Livestock is important for increased productivity in agriculture. As a subsidiary occupation, it supplements the income of poor farmers. It provides vital draught power to millions of holdings of poor farm families in rural areas; it provides the only source of organic manure.

Even with the existing low levels of livestock productivity, the contribution of the Animal Husbandry Sector to the national economy adds upto Rs 16,500 crores.

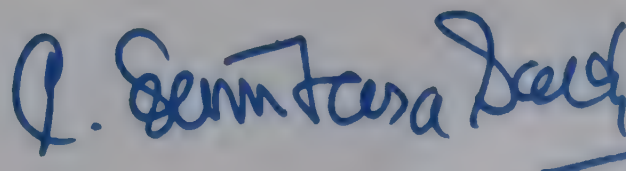
Among livestock-based vocations, dairying occupies a pivotal position. Dairying has an enormous potential to bring about rapid economic growth, particularly benefiting the weaker section. It forms an important component of all integrated rural development projects and related schemes.

During the last two decades, the annual production of milk has doubled to about 44 million tonnes. This

increase has been largely achieved by harnessing the energy and enthusiasm of millions of small farmers. However, there is still a wide gap between the demand and supply of milk; this is sought to be bridged by comprehensive cattle and buffalo development programmes.

Like other development programmes, enhanced milk production is dependent on efficient management, which, in turn, needs a sound data base. Efforts should be made to collect and collate all available information.

In this background, publication of the 1987 edition of the *Dairy India Yearbook* is welcome. A compendium on various aspects of dairying would be of utility for the planning and execution of livestock and dairy projects. I am sure that, like the earlier editions, this issue of the *Yearbook* would be found to be of use to all the segments of the dairy industry.



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New Delhi
August 18, 1987



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(Continued on page x)



Preface

It is heartening to write a preface to this new edition of *Dairy India 1987*, the third in the series. Having been associated with the compilation of this *Yearbook* since its inception in the early 'eighties when the first edition was published, I feel personally heartened at the shape it has taken from edition to edition in terms of putting together the key economic and technical information on the majority of essential aspects of dairy development and production.

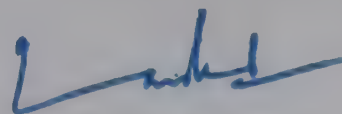
In the process, the *Yearbook* portrays the rapidly growing infrastructure of the dairy industry, dealing with milk production, processing, management and technology. While doing so, it identifies new opportunities and prospects in dairying that the industry offers, particularly to the new entrepreneur. This by itself is valuable.

Another major task accomplished by the *Yearbook* is to present a wide spectrum of developmental activities in different segments of the dairy industry, unfolding the hopes and aspirations of the Indian people. Further, the publication features various upcoming trends, including those in packaging, biotechnology, fodder production,

economic and technical feasibility of dairy farming, cheese and ice cream. In addition, another useful service that this publication renders is by putting together listing of some 7,000 specialists and organizations, engaged in dairying.

The scrupulous care in assembling a wide ranging data in this compendium is commendable. Conscious efforts have been made to retain the role of the *Yearbook* as a databook and not to endeavour any critical evaluation or commentary on dairy development in the country. This, to my mind, is in itself the most significant contribution to the cause of dairy development, as documentation of critical information in majority of developing world is seriously lacking.

One encouraging aspect of the compilation is the participation and cooperation of all segments of the dairy industry, without which such a coverage would not have been possible. The publisher must be complimented for his endeavour in bringing together such varied information which will serve as a useful work of reference to the dairy entrepreneurs, planners, scientists, teachers and students in dairy science.



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August 18, 1987

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Publisher's Note

The 1987 edition of *Dairy India* is significant in many ways. Building up on the earlier two editions, its data base has been broadened further to reflect the emerging trends in dairying. In the process, the new edition has become much bigger in volume than ever before—over 800 pages as against some 600 pages in the last edition.

We are indebted to Mr C. Srinivasa Sastry, Secretary to the Government of India, Department of Agriculture & Cooperation, Ministry of Agriculture, for contributing the Foreword to this edition. Notable is the contribution of Dr V. Kurien, Chairman, National Dairy Development Board, for his continuing guidance and encouragement.

I would like to express our gratitude for the unstinted and valuable guidance extended by Dr R.M. Acharya, Deputy Director-General (Animal Sciences), ICAR. For the improved standards of this new edition, we are also grateful to our Board of Editors.

As a result of greater participation by all segments of the industry, a more comprehensive profile of the industry has emerged. It is difficult to list the large number of specialists, institutions and agencies in various sectors of dairying who have extended their fullest cooperation in the compilation of this *Yearbook*. However, we would

like to mention the following: Ministry of Agriculture, GOI, National Dairy Development Board, Indian Dairy Corporation, Indian Council of Agricultural Research, National Dairy Research Institute, Indian Veterinary Research Institute, State Dairy Cooperative Federations, State Departments of Animal Husbandry & Veterinary Services, Planning Commission, Bureau of Indian Standards, the World Bank, and Food and Agriculture Organisation of the United Nations.

It is pleasure to express our deepest appreciation to our advertisers for their support to and participation in this publication. We also offer our thanks to Rekha Printers Pvt. Ltd., BBN Printers, Pal Bharati Press, Devarsons, Sumat Pershad & Sons and the Central Bank of India for accommodating us.

Let me affirm that the inclusion of any data in the *Yearbook* has not been a matter of payment or any other obligation. All possible care has been taken to ensure accuracy, but despite that, errors could creep in for which we seek the indulgence of our readers. To continue our efforts to improve the *Yearbook*, we invite comments, criticism and suggestions from our readers.



New Delhi
August 18, 1987

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You may also suggest the names of individuals/ organizations not presently listed and whom you consider suitable for inclusion.

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Dairy India 1987

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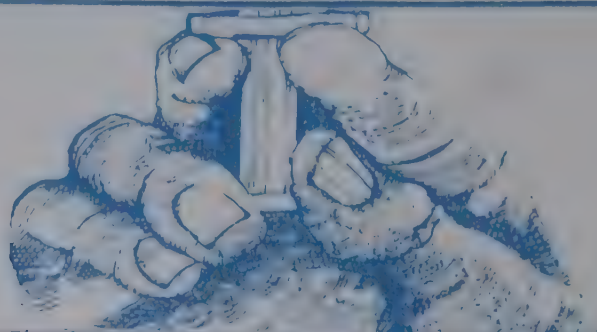
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DAIRY INDUSTRY IN INDIA

A PROFILE



Dr A.K. CHATTERJEE
*Animal Husbandry Commissioner,
Government of India*

&
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*Deputy Director-General (Animal Sciences),
Indian Council of Agricultural Research*

India's dairy industry is on the threshold of a good many changes that would totally transform the dairy scene and give the needed thrust to its rapid growth. To meet the challenges ahead, greater emphasis needs to be placed on facilities in the areas of milk production, processing, marketing and research.

INDIA, with an annual milk production of 43.9 million tonnes in 1986-87, ranks third in the world after Soviet Union and the United States. The milk production is expected to surge forward in the coming years to cross the 50 million-tonne mark by 1990. The target for 2000 AD is 65 million tonnes.

Milk and milk products play a vital role in the country's agricultural economy, being the second largest contributor to the gross agricultural produce. In 1984-85, the value of milk and its products exceeded Rs 100,000 million, ranking after rice, but before wheat. Hence, milk can be regarded as

India's second most important agricultural commodity. Equally important, if not more, is the role of dairying in providing sustenance to millions of farmers, constituting 75 per cent of the total population in some 80 million farm households, consisting largely of the rural poor, with an annual income of less than Rs 3,800 per family. Milk provides both nutrition and supplementary income to these weaker sections.

Dairy development fits most appropriately in the country's programme of increasing food production, rural employment and distributive justice. In small farmer situation also, it directly helps in increasing crop produc-

DAIRY INDUSTRY PROFILE *contd.*

The annual milk production has more than doubled in the last two decades to an estimated 43.9 million tonnes in 1986-87. As much as 90 per cent of this production comes from only 12 of the 24 states in the country.

tion through making fluid cash available for the purchase of essential inputs, e.g., quality seeds, fertilizers, pesticides, etc. Thus, the contribution of dairying to the nation's health and economic welfare is rather unique.

Production: The breakdown of India's milk production estimated for 1986-87 is as follows:

Buffalo milk	22.9 million tonnes	(52%)
Cow milk	19.8 million tonnes	(45%)
Goat milk	1.2 million tonnes	(03%)
Total	43.9 million tonnes	

The annual milk production has more than doubled in the last two decades from about 19.7 million tonnes in 1969-70 to the present level of 43.9 million tonnes.

As much as 90 per cent of this production comes from only 12 states. In the decreasing order of output, they are: Uttar Pradesh, Punjab, Rajasthan, Gujarat, Tamil Nadu, Madhya Pradesh, Andhra Pradesh, Haryana, West Bengal, Maharashtra, Bihar and Karnataka. Even in these states, bulk of the output is confined to a limited number of pockets (See Table No 16).

The buffalo still continues to be the major source of milk in India and is the backbone of commercial dairying which has led to increase in the spread of buffaloes. However, its dominance is on the decline with the emergence of the crossbred cow which is increasing in number from year to

year to the present level of about six million. Presently, of 12 million lpd of milk handled by the modern organised sector, cow milk account for over 45 per cent.

Consumption: The per capita milk availability has been on the increase in recent years from 39.4 kg (108 gms/day) per year in 1966 to 57.3 kg (157 gms/day) in 1986-87. It is expected to further improve to 62.8 kg (172 gms/day) by the end of this decade in 1990 and to 65.7 kg (180 gms/day) in 2000 AD. According to the FAO estimates, the per capita availability in the developing countries during 1984-85 was 38 kg, as against 105 kg for the world. The pattern of milk availability in urban and rural areas of the country is given in Table No 1.

Today, the major constraint to milk consumption is not only the limited production of milk, but the low purchasing power of the bulk of people as well as inadequate handling and processing facilities and marketing infrastructure.

Seventh Plan: The Seventh Five-Year Plan (1985-86 to 1989-90) envisages an outlay of Rs 11,346.2 million on animal husbandry and dairying, of which a sum of Rs 4,934.5 million is earmarked for dairying. Since 1950, the total expenditure on these sectors during all the past Plans amounted to Rs 15,841.7 million. The Seventh Plan aims to achieve the target of 51 million tonnes of milk production by 1989-90. The approach and strategy of the Seventh Plan include the following objectives: (i) to provide infrastructure necessary to achieve the accelerated

Today, the major constraint to milk consumption is not only the limited production of milk, but also the low purchasing power of the bulk of people as well as inadequate handling and processing facilities and marketing infrastructure.

TABLE 1. Milk supply and availability in urban and rural areas in 1986-87.

Group	Population in million	Milk supply (in million lpd)	Per capita milk avail- ability per day (in gms)
<u>Urban Areas</u>			
Metro cities	32 (4%)	8 (6.7%)	250
Other areas	168 (21%)	32 (26.6%)	190
<u>Rural Areas</u>			
In Milkshed	236 (32%)	45 (37.5%)	190
Outside Milkshed	330 (43%)	35 (29.2%)	105
All India	766 (100%)	120 (100%)	157

growth in livestock production; (ii) to enable a large section of the rural population, including the small and marginal farmers, labourers, tribals and weaker sections, to improve their nutritional and economic status by providing them gainful employment through livestock rearing; (iii) to make available good breeding material for increased productivity; (iv) to strengthen animal health facilities and bring them to the doorstep of the farmer; (v) make quality fodder seeds available more widely; and, (vi) increase the coverage of area and farm families under cooperative dairy programmes and improve milk handling, processing and marketing infrastructure. The country has launched a technology mission for dairy cattle improvement through embryo transfer technology. Another technology mission for

dairy development, based on model being used in Operation Flood but covering larger areas, is being formulated by the National Dairy Development Board for the Government of India.

Operation Flood (OF): Phase III of Operation Flood, coinciding with the Seventh Plan period, seeks primarily to consolidate the extensive milk procurement and marketing base built during OF-I and -II. Presently, OF covers 250 districts, grouped into 168 milksheds in 23 States/UTs, with over 5 million farm families in 49,000 village milk producers' cooperatives. They sell, on an average, some 8 million litres of milk every day, after retaining 25 per cent of it for their own consumption. It fetches them about Rs 30 million per day, aggregating to Rs 10,000 million per year.

DAIRY INDUSTRY PROFILE *contd.*

Over 5 million farm families in 49,000 village milk producers cooperatives sell on an average some 8 million litres of milk every day, after retaining 25 per cent of it for their own consumption. It fetches them about Rs 30 million per day, aggregating to Rs 10,000 million per year.

The peak procurement of milk is 10 million litres per day (mlpd) during flush season, and an annual average of 7.9 mlpd. Milk collected was processed in 129 rural dairy plants. Some 48 of them also produced 86,000 tonnes of milk powder, 35,000 tonnes of butter and 39,000 tonnes of ghee in 1986-87.

The OF-III aims at increasing the rural milk procurement to a peak of 18.3 million litres per day (mlpd), collected from over 8 million milk-producer families by 1990. Of this quantity of milk procured, over 13 mlpd are proposed to be sold as fluid milk in the urban market. Farmers would then receive almost Rs 20,000 million annually for milk sold by them to the cooperatives. The outlay proposed for OF-III is about Rs 6,812.9 million. The yearwise key physical targets of OF-III are listed in Table No 8.

During this phase, urban milk marketing will be further strengthened with the introduction of the Ultra High Temperature (UHT) milk and aseptic packaging system. Aseptically-packaged UHT milk is expected to account for about 10 per cent of the milk marketed by 1990. Thus, it will provide a new dimension in improving the milk availability and offer convenience to consumers.

LIVESTOCK PRODUCTIVITY

India's bovine population, according to 1982 livestock census (provisional), is 191 million cattle and 69 million buffaloes. Of these, the milch cows number

50.71 million and buffaloes 28.32 million. About 80 to 85 per cent of the bovine population is non-descript. Of the descript, the large majority belongs to draft and dual purpose breeds. Even the dairy breeds have a level of production lower than the average of the crossbreds, involving exotic dairy inheritance around 50 per cent. The number of crossbred cattle is presently estimated at 12-13 million, of which more than half would be breedable females.

According to the National Commission on Agriculture, the average annual milk yield per cow is only of the order of 157 kg and of buffalo, 504 kg. The low milk yield is due to poor production potential of the dairy animals, lack of adequate nutrition and health cover. Efforts for improvement through breeding have been inadequate, except through crossbreeding with exotic dairy breeds. However, in milch herds in the organised sector where dairy animals are reared for commercial milk production, higher production per lactation has been commonly reported at 800 kg for descript cows, 1,250 kg for buffaloes and 1,800 to 2,400 kg for crossbreds.

For improving livestock productivity, an extensive infrastructure is being developed in the country. As a result, presently, there are 500 key village blocks (KVBs), 134 Intensive Cattle Development Projects (ICDPs), 94 cattle breeding farms, 51 buffalo breeding farms, 184 exotic cattle and crossbred farms.

The contribution of Military Dairy Farms

Buffaloes constitute only one-third the total milch bovine population, but account for more than half of the total milk production. But the genetic improvement of buffaloes has been rather slow. The research base for improving buffalo production has been expanded with the setting up of biotechnology centres.

to improve the productivity and the reproductive efficiency of both cows and buffaloes has been widely recognized. In fact, the credit for the birth of organized dairying in India on scientific lines must go to the Military Dairy Farms, the first of which was established in 1889 in Allahabad. These farms also pioneered crossbreeding of cattle in the country. Today, a network of some 80 farms, including 42 cattle-holding farms, dot the country.

Gaushalas, now numbering over 1,000, are also engaged in cattle development. Recognising their potential, the Government set up the Central Council of Gosamvardhana (CCG) in 1952 for the production of high-quality indigenous/crossbred heifers. The progressive gaushalas include those at Nasik, Uruli Kanchan, Amritsar, Indore and Ahmednagar. The Bombay Pinjrapole, established in 1834, is noted for its herd of pure-bred Gir cows, numbering 350. Another gaushala in Bombay, the Bombay Gow-Rakshak Mandli, which celebrated its centenary in 1986, has two institutes — one for research and development of dairy cattle and the other for fodder research and grassland development. Another gaushala of note is the Sabarmati Ashram Gaushala (SAG) founded in 1915 by Mahatma Gandhi. Its management was entrusted to the National Dairy Development Board in 1973 to conduct and expand its animal husbandry work on scientific lines. SAG has a sperm station for the production and supply of frozen and liquid semen and a training centre for the spread of AI technology in villages. The Gaushala also produces and

sells stud bulls and cows to various agencies and farmers.

Upgrading Dairy Animals: Buffaloes constitute only one-third of the total milch bovine population, but account for more than half of the total milk production. They are known to be good converters of low-grade (more fibrous) feeds into high-value milk, containing 7 per cent fat which is almost twice as much as that in cow milk. Buffalo is a hardy animal and requires much less attention or care, but its genetic improvement, however, has been rather slow. Steps have been taken to tackle problems related to their production through an ICAR sponsored All India Coordinated Research Project (AICRP) on Buffalo Breeding. This would also help overcome the neglect that buffalo has hitherto been subjected to, being commonly regarded as a symbol of primitive agriculture.

(Dairy farming, as practised today, is at the subsistence level, based on one or two non-descript cows or buffaloes, fed mainly on crop residues and other agricultural and industrial byproducts, besides scrub grazing. At this level of livestock rearing, no spectacular increase in animal productivity can be expected.) Equally relevant — although rather unfortunate — is the fact that these hundreds of millions of farmers who form the base of the dairy farming may have to continue with relatively lower levels of production, and breed cattle for draft and dual purpose. The hopeful part of the picture is that any wee bit improvement in their productivity through breeding with superior

DAIRY INDUSTRY PROFILE *contd.*

Dairying shall continue to be a subsidiary occupation and a major source of income for small farmers and landless labourers. In any scenario for tomorrow's dairying, non-descript cows and buffaloes will remain the backbone of dairy farming.

bulls, improving nutritive value of crop residues and health cover can snow-ball into leaps in milk production because of the additive nature of the gains.

So, in any scenario for tomorrow's dairying, one cannot visualize the disappearance of the non-descript cows and buffaloes, because they form the backbone of the dairy industry and general agriculture, the latter through the provision of draft cattle and farm yard manure. There is no way in which one can even attempt to replace en mass the non-descript 150 million cattle and 45 million buffaloes with upgraded ones. So, the gigantic task ahead can well be imagined.

One high technology solution is through the commercial application of the embryo transfer technology for rapid replication of the elite females as bull mothers. Thus, the genetic gains can be achieved much faster than is possible through conventional methods which also suffer in implementation.

Breeding: Rapid improvement in the quality of cattle and buffalo is presently being brought about through inseminating them with frozen semen of genetically superior bulls. Towards this end, a network of 15 semen freezing stations, 52 frozen semen banks and about 5,500 field artificial insemination centres, utilizing frozen semen is functioning in 74 districts in 16 states. The apex agency for this programme is the Central Frozen Semen Production and Training Institute at Hessarghatta in Bangalore. The units of AICRPs on Buffalo and Cattle Improvement are also contributing to the frozen semen

availability. The number of desi cows to be inseminated artificially with the semen of exotic/crossbred bull is expected to reach a level of 9.2 million in 1987. At the field level, the conception rates achieved with AI average around 20 to 30 per cent (See Table No 42). There is an urgent need to identify the gaps in current AI practices to effectively improve the conception rates.

A coordinated cattle breeding project for production of progeny-tested proven bulls under field conditions is functioning in the states of Kerala and Assam. It is proposed to expand this programme to two more states for faster improvement of the quality of crossbred cows.

The centrally-sponsored Herd Registration Scheme, which aids in identification of animals of high genetic merit, is functioning at Rohtak (Haryana), Ahmedabad (Gujarat), Ongole (Andhra Pradesh) and Ajmer (Rajasthan). Herd books for nine cattle and three buffalo breeds have been opened. During 1986-87, some 6,000 dairy animals were expected to be registered at 100 milk recording centres.

While the State Governments are managing the bull production programmes, the Government of India have set up seven Central Cattle Breeding Farms for the production of pedigreed/proven bulls of exotic (Jersey & Friesian) and indigenous (Tharparkar & Red Sindhi) cattle and buffaloes (Murrah & Surti). A number of bull mother farms have also been set up under Operation Flood.

If animal production has to prosper in the country, new technologies need to be developed based on feeding of crop residues and agro-industrial by-products, the major sources of protein and energy in livestock feed.

Feeding & Nutrition: Chronic shortages of feed and fodder and poor nutritive value of such feeds available have lowered the productive capacity and fertility of India's livestock. It has been said that the present output of milk can be appreciably increased — some say by as much as 20 to 25 per cent — if the present population of cows and buffaloes were adequately fed. However, the difficulty arises in finding ways and means of achieving this objective in view of the inadequate availability of feed and fodder.

If animal production has to prosper in the country, it must continue to be based on feeding of agro-industrial by-products and crop residues which are the major sources of energy and protein in livestock feed. New technologies are being developed to utilize cellulose and semi-cellulose in ligno-cellulosic materials, e.g., crop residues, fallen tree leaves. One step in this direction is the upgrading of straws to improve their nutritive values through ammonia treatment using 4 per cent urea solution to create 50-60 per cent moisture in the straw and tightly packing such straw for about two weeks. Similarly, steam treatment of sugarcane bagasse and impregnation of urea and molasses treating them with urea. The urea-molasses block, developed in the laboratories of the National Dairy Development Board, ICAR institutes and agricultural universities is now under large scale demonstration. Already, four units of 25 tonnes per day capacity have gone into production. Increased milk yields have been reported to the extent of 20 per cent.

Today, India has an organized feed compounding industry. In the past 20 years, the annual production of compounded feed has gone up to 1.5 million tonnes from 40,000 tonnes. It is utilizing a large and increasing quantity of agro-industrial by-products and non-protein nitrogen sources. However, this production meets only a small percentage of the total feed concentrate requirements even for the organised livestock farming sector in the country. The installed capacity of the 100 units, as represented by the Compounded Livestock Feed Manufacturers' Association (CLFMA) members, is over 2 million tonnes.

The importance of green fodders in economic livestock production is well recognized. However, one constraint faced is their limited availability. Except in the states of Punjab and Haryana with around 10 per cent of cultivated land being under fodder production, the overall average is around 4 per cent. Logically, one-third of the area should be under fodder production in crop rotation. Other serious limitations in propagating cultivated fodder production are non-availability of seed of high producing fodder varieties and little extension infrastructure. To overcome the shortage of quality foundation/certified seeds of fodder, the Government of India have set up seven Regional Stations for Forage Production and Demonstration, along with the Central Fodder Seed Farm at Hessarghatta.

One new system under demonstration is the Fodder Production Unit (FPU) which produces fresh, green concentrate fodder in

DAIRY INDUSTRY PROFILE *contd.*

A programme for systematic control of livestock diseases of national importance is under implementation. The outbreak and mortality due to major diseases are on decline.

soiless trays in a hermetically-sealed and environmentally-controlled chamber, harvested on an eight-day continuous cycle round the year under any climatic condition.

Health Care: Presently, a network of over 16,000 veterinary polyclinics, hospitals and dispensaries, more than 20,000 first-aid centres including mobile dispensaries, vaccination units and some 250 disease diagnostic laboratories provide health care facilities for over 400 million livestock. Steps have been taken to set up five Central Regional Disease Diagnostic Laboratories at Gurgaon (Northern Region), Hyderabad (Southern Region), Patna (Eastern Region), Jhansi (Central Region), and Ahmedabad (Western Region).

Besides, 18 public sector veterinary biologicals and three private sector institutions provide a variety of vaccines against a number of major diseases of livestock, such as RP, FMD, BQ and HS.

A national veterinary biological products quality control centre is being set up in collaboration with the Netherlands Government at Gurgaon, Haryana, near Delhi. The centre would ensure that the production of vaccines and diagnostic reagents are of international standards. A standing National Advisory Committee on Animal Vaccines has been constituted to review the production and quality control of vaccines under the Drugs & Cosmetics Act. Steps are being taken to coordinate vaccine production to work out a national grid for their supply.

A programme for the systematic control of

livestock diseases of national importance such as bovine tuberculosis and brucellosis is under implementation. Under the on-going programme of rinderpest eradication, a new campaign of Operation Rinderpest Zero, with a central outlay of Rs 100 million, has been launched. About 65 million vaccinations against RP were expected to be carried out in 1986-87.

A National Committee on the Foot-and-Mouth Disease (FMD) has been recently constituted to coordinate and monitor the campaign against this dreaded disease. Some 11 million doses of FMD vaccine were manufactured by the Indian Dairy Corporation's unit, Indian Immunologicals in Hyderabad. In addition, there was production of about 6 million doses from three other units — IVRI, Hoechst and BAIF. Shifts in the predominance of different types of FMD virus strains were reported in the various regions of the country by the ICAR sponsored AICRPs on Epidemiological Studies on FMD.

A modest beginning has been made in the creation of disease-free zone, comprising the three southern-most districts of Kanyakumari, Trivandrum and Quilon. This would boost the country's external trade in livestock and livestock products.

Under Operation Flood, over 28,000 dairy cooperative societies are providing animal health services to its farmer-members. These are supported by some 640 mobile veterinary clinics which also attend to the emergency calls, some them through radio network.

The outbreak and mortality due to major

The prospects ahead for milk processing are indeed staggering. New ideas are having their impact on process and product development. Some of these areas which will attract increasing attention include process innovations, new packaging and large-scale production of traditional products.

cattle diseases are on the decline, as reflected in the chart on page 179. During the current Seventh Plan, new facilities to be added include: 53 mass vaccination units, 57 emergency disease squads, 86 district clinical laboratories and five regional disease diagnostic laboratories. To man this growing disease diagnostic laboratories and to strengthen the infrastructure, an estimated 25,000 veterinary and para-veterinary personnel would be needed to meet the Plan targets by 1990.

PROCESSING

Of the total milk output of 120 million lpd (mlpd), the organized sector handles an estimated 10 per cent of it in 250 dairy plants in the cooperative and public sectors, with a throughput of 12 mlpd (equivalent to 4.4 million tonnes per year).

The ten dairies in the four 'metro' cities of Bombay, Calcutta, Delhi and Madras alone handled 3.1 mlpd. The rural dairies marketed, on an average, about 3.4 mlpd of fluid milk every day in 139 Class I and 308 smaller towns during 1986-87. The average throughput of the rural dairies under Operation Flood in January 1987 was 10.7 mlpd, with utilization at 93 per cent of the installed capacity. During 1986, the output of milk powder in the country reached a level of 127,000 tonnes, which included about 48,000 tonnes of infant milk food.

New ideas are having their impact on process and product development. Some of these areas that will attract increasing attention are:

- Aseptic Packaging: A changeover from pasteurization to sterilization of fluid milk is under way with the increasing realization about the considerable saving in the cost of marketing and distribution through aseptically-packed milk. In India, techno-economic factors such as inadequate refrigerated distribution network including absence of refrigerators at many homes add to the difficulties of distributing pasteurized milk. So, the aseptic packaging, using UHT process, for marketing fluid milk has emerged as an attractive commercial alternative. Seven aseptic packaging stations have been commissioned at Surat, Indore, Jaipur, Guntur, Baroda, Allepey and Salem. The advent of the UHT milk makes the cold chain superfluous. The introduction of aseptic packaging has added a new dimension in the marketing of milk and milk products. Aseptically-packed milk has an extended shelf-life and can be stored at room temperature without the need for refrigeration, making it a durable grocery item which can be bought anywhere, at any time and in any quantity.
- Indigenous Dairy Products: Various process innovations have been developed at National Dairy Research Institute and National Dairy Development Board for the manufacture of burfi, dahi, kheer, shrikhand, gulab jamun, rasagollas, mishti doi and the like. The use of modern milk products like concentrated and dried milk powder for chhana-making

DAIRY INDUSTRY PROFILE *contd.*

The most significant contribution of the cooperative dairying is to bridge the rural producer and the urban consumer through the National Milk Grid. It has been able to bring to the doorstep of the dairy farmer the lucrative urban market which is otherwise inaccessible to him.

and khoa would be adapted for use in dairy plants, as also at halwai level in rural areas. NDDB has taken a welcome initiative in the development and commercialization of process innovations for manufacturing Indian traditional sweets at the Sugam Dairy in Baroda.

- Newer Packagings: A wide range of low-cost packaging systems and material are available which can be adapted/evolved for a variety of traditional dairy milk-based sweets and related products to facilitate handling at room temperatures. Good and efficient packaging would not only ensure freshness and flavour, but also extend shelf life of milk products, and they are rendered safe and wholesome without any contamination or deterioration because the pack is tamper-proof. It will also result in significant reduction in their distribution and transportation costs, while widening the export markets that can be tapped, particularly in the Gulf countries. Among the new techniques that offer scope for adoption include aseptic filling, high-speed machine operation, printability and computerization, vacuum filling, and use of multi-layer, co-extruded plastic film with a wide range of barrier properties to retain the goodness of milk products packed.

The prospects ahead for milk processing are indeed staggering. Milk, the first food man takes on his birth, is a chest of more

than 2,000 ingredients, many with unique functional and nutritional properties, which modern processing is capable of isolating and refining for a multiplicity of uses in the food and related industries. Dr Ernest Mann, the world-renowned dairy consultant, in his concluding presentation at the XXIInd International Dairy Congress held in September 1986 spoke of the 'treasure trove' that is milk and to tap it as one of the challenges facing the dairy industry in its drive to go forward in new directions.

MARKETING

With expanding urbanization, the consumption of milk and milk products is steadily rising. Simultaneously, the standard of living of urban population is also going up, resulting in the increased demand for dairy products. However, the milk producer is located in the remote rural area. The most significant contribution of the cooperative dairying is to bridge the rural producer and the urban consumer through the National Milk Grid (NMG). It has been able to bring to the doorstep of the dairy farmer the lucrative urban market which is otherwise inaccessible to him. So, a fair return to the producer is assured, without sacrificing the interests of the urban consumer.

According to the last census, India's urban population is settled in some 3,245 towns, out of which some 1,225 towns have a population of over 20,000 each — large enough to sustain organized milk marketing. These include 12 cities (each with a population of over one million), 204 (over one lakh), and 270 (over 50,000). Presently,

One major breakthrough in milk marketing has been the introduction of aseptic packaging that promises to revolutionise liquid milk marketing as was achieved by the milk bottle in 1950.

only 447 Class I cities and other smaller towns are served by the organized sector, handling over 6 million litres of hygienically processed milk per day to some 55 million consumers.

According to the data available for the four metro cities, the demand for fluid milk market was estimated at about 6 million lpd, of which 50 per cent or 3 million lpd was met with by the ten public sector dairy plants in these cities, as per Table No 2.

TABLE 2. Demand and share of fluid milk market in four metro cities by public sector/cooperative dairies in 1984-85.

million lpd			
Cities	Estimated demand	Average throughput	Market share percentage
Bombay	2.26	1.14	51
Calcutta	1.11	0.42	39
Delhi	1.70	0.95	56
Madras	0.73	0.42	57
Total	5.80	2.93	50

The overall trend in the milk utilization in the country is given in Table No 3.

One major breakthrough in milk marketing has been the introduction of aseptic packaging that promises to revolutionise liquid milk marketing, as was achieved by the milk bottle in 1950. The changing milk marketing systems are reflected in Table No 4.

TABLE 3. Milk utilization pattern in India.
percentage

Particulars	1951	1961	1984-85	1985-86
Liquid milk	39.3	45.1	46.0	46.0
Milk powder*	-	-	3.0	3.6
Ghee	39.3	31.8	28.0	28.0
Butter	6.0	6.4	6.5	6.5
Khoa	4.4	4.7	5.5	5.5
Cream	0.5	1.9	0.5	0.5
Curd	8.8	8.1	7.0	7.0
Ice-cream	0.7	0.7	0.7	0.7
Cheese**	-	-	2.0	2.0
Others	0.4	1.2	0.8	0.2

*Includes infant milk food

**Includes cottage and processed cheese.

TABLE 4. Share of milk marketed by various systems.

million lpd				
System	1985	(%)	1990	(%)
Sachets	2.53	50.0	6.20	50.0
Cans	0.94	18.5	0.66	5.3
Bottles	0.89	17.5	0.62	5.0
Bulk vending	0.72	14.0	3.72	30.0
Aseptic packaging	Neg*	Neg*	1.20	9.7
Total	5.08	100.0	12.40	100.0

*Neg: Negligible

DAIRY INDUSTRY PROFILE *contd.*

The first of the large-sized automated milk plants of capacity of one million litres per day is to be set up at Gandhinagar in Gujarat. Two more plants of this capacity are proposed to be set up in Andhra Pradesh and Rajasthan.

Equipment: The value of total demand for dairy equipment in India increased from Rs 30 to 40 million in 1970 to Rs 800 to 900 million in 1986. Presently, the Indian dairy equipment manufacturers — many of them being small-scale units as well — are in a position to compete in the world market. Some of them are geared to undertake jobs on a turn-key basis.

Till the 'fifties, a fluid milk plant of 10,000 lpd capacity was considered as a fairly large unit. Most of the equipment for it, including bulky items like storage tanks, used to be imported. In the decade of the 'seventies, a large number of dairy units of capacities between 60,000 lpd and 400,000 lpd were set up. Now, the first of the large-sized automated milk plants with capacity of one million litres per day is to be set up at Gandhinagar in Gujarat. Two more plants of this capacity are proposed to be set up in Andhra Pradesh and Rajasthan.

Today, the country has attained self-reliance in dairy equipment in almost all aspects. The quantum of imported equipment dropped from a level of 60 per cent of the domestic demand in the 'seventies to barely 10 per cent now. Presently, most of the requirements of the dairy industry is met indigenously by some 130 enterprises, including five in the public sector. Notable gains in the recent years include sophisticated equipments like electronic milk tester.

Among equipment yet to be made in the country include milk flow meters, UHT plants, large-capacity homogenizers,

continuous ice cream freezers, processed cheese and butter-oil equipment, self-desludging separators, packaging equipment for processed cheese and special stainless steel fittings. Research for design and development of such equipment needs greater attention. The equipment industry is poised for a major growth in size and sophistication to meet the Seventh Plan targets.

In what directions would this industry grow in the years to come to meet the challenges ahead? The country is already making milk storage tanks (silos) of 5,000 to 10,000-litre capacity. Aluminium milk cans of 40-litre capacity are used for milk collection. The organised sector has a capacity of 70,000 to 100,000 cans per year.

With milk collection on the increase, the per capita cost of milk collection needs to be reduced. For this, there should be less frequent collection from villages than the present twice daily routine. Therefore, milk would have to be stored in bulk tanks at the village cooperative society level and transported by road tankers, gradually rendering cans obsolete. Long-distance transportation of milk would involve containerized tankers, suitable for both rail and road. And ahead in the foreseeable future lies the exciting prospects of milk pipelines — the eventual solution. Already such milk pipelines are functioning in the Netherlands and Switzerland.

One promising area of substantial cost saving in bulk milk handling is the use of mechanised material handling systems which

To ensure the orderly development of dairy equipment industry, it is essential to identify future trends, the technology gaps and priorities in the years ahead to give the relatively young industry a momentum for growth.

is expected to absorb a substantial part of dairy investment.

Pasteurization plants in the range of 2,000 to 25,000 litres per day capacity with regeneration efficiency as high as 90 to 95 per cent are made indigenously. At least 98 per cent regeneration of heat would have to be achieved in the pasteurizers.

Solar energy has also been used on an experimental basis in dairy plants at Bhopal, Warangal and Indore for purposes such as bottle and can washing, as also washing of milk tanks and tankers. In dairy plants, plates and control instruments are still imported.

Dairy separators and chambers of up to 20,000 litres per hour capacity are totally manufactured in India. Self-cleaning separators of 20,000 litres capacity is progressively being made locally to meet the demands of the industry.

Major critical components of homogenizers are imported, although some units have obtained industrial licence for the manufacture of homogenizers.

Pumps: A wide range of quality pumps with capacity ranging from 5,000 to 30,000 litres per hour, is manufactured locally and in sufficient numbers. Manufacture of larger-sized pumps are also being planned.

Stainless Steel Pipes & Fittings: These items are being made indigenously, but large imports are also made because the indigenous capacity is inadequate both with regard to quantity and quality. This lacuna is coming

in the way of the production of larger quantity of fittings.

Milk Products Manufacture: An increasing range of traditional milk delicacies such as shrikhand, gulab-jamun, rasagolla and peda is finding a place in the product mix of various dairies. Their mass production is calling for adaptation of existing food processing equipment designed for Western products. For example, meat ball machines to roll out gulab-jamuns or rasagollas. Similarly, better packaging would ensure freshness, wholesomeness and longer shelf-life. The opportunities in packaging are indeed vast!

To ensure orderly growth in the production of dairy equipment, a Food Industry Equipment Division has been created in the Confederation of Engineering Industry to give the relatively young industry a momentum for growth, stressing quality and productivity. It will also help to identify future trends, the technology gaps and the priorities in the years ahead.

Education & Research: The 26 agricultural universities have nine dairy science colleges producing graduates with degree in dairy technology, and 27 veterinary colleges producing graduates with degree in veterinary and animal science. These provide a sound base for education, extension, training and research as well as the infrastructure for meeting the wide-ranging requirements of manpower for the rapidly growing dairy industry. Apex institutions include the National Dairy Research Institute (NDRI),

DAIRY INDUSTRY PROFILE *contd.*

While a sound base exists for education and research, steps however need to be taken for increasing the intake of technical personnel at various levels to support the livestock development programme.

Indian Veterinary Research Institute (IVRI), and the National Dairy Development Board (NDDB).

With the realisation of the importance of the indigenous animal genetic resources, a National Bureau of Animal Genetic Resources (NBAGR) is functioning at the NDRI campus at Karnal, assisted by a sister institute, National Institute of Animal Genetics (NIAG). It proposes to undertake surveys for identification, description and evaluation of indigenous germ plasma resources and to ultimately recommend to the Central and State Governments and also itself undertake conservation of the native cattle and buffalo germ plasma, noted for its dairy/draft utility and higher resistance to tropical heat and diseases.

For undertaking research on cattle breeding under diverse climatic conditions, the Indian Council of Agricultural Research (ICAR) has sponsored the All India Coordinated Research Projects (AICRPs) on cattle, buffaloes, goats, FMD, Haemoprotista diseases, disease surveillance, monitoring and forecasting of animal diseases, utilization of agro-industrial byproducts and wastes for evolving economic livestock rations and forage crop production. Recently, the ongoing AICRP on Cattle Breeding has been reorganized and upgraded into the Project Directorate on Cattle and will undertake and coordinate researches on:

- (i) Genetic studies on Holstein cross-breeds utilizing military dairy farms;
- (ii) Genetic studies on indigenous breeds of cattle, initially Haryana and Ongole;

(iii) Studies on nutritional efficiency and requirements of Holstein crossbred cattle; and,

(iv) Studies on adaptation of Holstein crossbred cattle.

It will also coordinate the activity of a coordinated programme on developing systems for field recording of performance data and their utilization in progeny testing of bulls.

The research base for improving buffalo production has been expanded with the setting up of biotechnology centres at IVRI and NDRI, which will take up basic studies on multiple ovulation embryo transfer technology (MOET). The National Institute of Immunology (NII), in cooperation with Indian Agricultural Research Institute and other institutions, is also standardising techniques for embryo transfer. The Department of Biotechnology has taken up a Technology Mission for Cattle Improvement through embryo technology, which involves NDDB, ICAR and NII. An Indo-US cooperative project on ET has also been initiated by the ICAR. Recently, a Central Institute for Research on Buffaloes (CIRB) has been established at Hisar in Haryana. It will also apply MOET in genetic improvement of buffaloes and participate in the AICRP on embryo technology. The Second World Buffalo Congress is scheduled to take place in New Delhi in November 1988 to discuss these and related problems.

The shortage of technical manpower is hampering the implementation of dairy development programmes. The annual demand for veterinary and animal science graduates is

The low productivity of some 75 million non-descript cows and buffaloes is weighing down the milk enhancement programmes. How to bring about even small gains in their productivity is a major challenge.

estimated at over 2,000 as against the annual output of 1,640. By the end of the Seventh Plan, this shortage is expected to rise to 4,000. The major demand of manpower is for livestock improvement programmes. Keeping in view the recommendations of the National Commission on Agriculture, it is high time that specialized manpower for animal production and animal health programmes is created by the present faculties of veterinary and animal sciences and employed by the same organizations dealing with animal husbandry and dairy development through creation of separate cadres.

There is an increasing concern among planners regarding the inadequate weightage given to practical aspects of breeding, nutrition, management and extension in the curricula of undergraduate programme for veterinary and animal science in most of the agricultural universities. The organization of training leading to specialized degree will allow more emphasis on clinical aspects of animal health and production — subjects for animal-production specialization.

There is also need to strengthen the programmes for the transfer of technology in veterinary and animal sciences in many agricultural universities and the ICAR animal science research institutes.

CONSTRAINTS

The low productivity of some 75 million non-descript cows and buffaloes is weighing down the milk enhancement programmes. How to bring about even small gains in their productivity is a major challenge.

- Another constraint is the shortage of quality dairy animals, particularly in the milkshed districts. With available credit facilities and the difficult demand-supply position of good milch animals, their selling price is spiralling high. It may be desirable to take up programmes for genetic upgradation of low-producing animals in these areas.
- Inadequate feed and fodder resources come in the way of the more rapid growth of milk production in the country. The methods available for increasing and improving feed resources need to be more expeditiously and effectively utilized.
- Mortality and morbidity through diseases are causing economic losses in livestock production. According to studies made by IVRI, the average expenditure on veterinary and health care per animal worked out to Rs 6.04 in 1985. More attention needs to be paid to livestock health to reduce economic losses.
- Inadequate milk handling/processing facilities and marketing infrastructure are coming in the way of milk procurement. As much as one million litres of milk per day that was available could not be collected during the flush season in surplus states of Gujarat, Haryana, Maharashtra, Punjab, Rajasthan and Uttar Pradesh.
- Suitable low-cost packing materials and systems need to be developed that pack freshness and flavour and extend shelf-life at ambient temperatures for a wide range of dairy products, particularly

DAIRY INDUSTRY PROFILE *contd.*

Gains made in milk production in the first half of the 'eighties have been significant with annual growth rate of 4.6 per cent. However, prospects ahead promise a further improvement with an annual growth rate of 6.8 per cent.

traditional milk sweets.

- The shortage of technical manpower is hampering growth of livestock production. Corrective steps need to be taken for increasing the intake of technical personnel at various levels, covering the whole spectrum from technician to professional manager to support the development programmes for enhanced milk production.
- Presently, statistics relating to livestock production are inadequate. Similarly, the present arrangement for undertaking the livestock census is also far from satisfactory. Consequently, a time lag of three-four years occurs in the release of results in the absence of an efficient system of compilation and tabulation of data at different levels.

PROSPECTS

- The Indian dairy industry is on the threshold of a good many changes that would totally transform the dairy scene and give the needed thrust to its rapid growth. To meet the challenges ahead, greater emphasis needs to be placed on facilities in the area of milk production, processing, marketing and research.
- Although gains made in the milk production in the first half of the 'eighties have been significant with an annual growth rate of 4.6 per cent, prospects ahead promise a further improvement with an annual growth rate of 6.8 per cent. This trend is due to better husbanding of technical inputs (breeding, feeding and health cover) and improved management practices. With

sound base for increased food production, there has been a corresponding increase in the quantity and quality of crop residues for livestock feed. Further, as a result of implementation of various cattle developmental schemes, the number of high-yielding milch animals, including cross-breds, is increasing in population, resulting in higher milk production.

- For optimum utilization of dairy herd, the urban milk supply be based on high-yielding crossbred cows and rural demand, on desi cows. The milk from buffalo could be largely used for the manufacture of products such as ghee, other indigenous dairy products and milk powder or converted into conserved milk solids to be reconstituted into fluid milk during lean season.
- Innovative packaging systems have added a new dimension to dairy development. Before long, milk and its products would be considered as grocery items, available at any time, in any quantity and anywhere. This will become possible by the application of newer technologies that will free milk and its products from the confines of cold chain, resulting in considerable saving in marketing and distribution costs.
- For the first time, the consumer in urban areas would have a choice of milk and dairy products to cater to his needs. Further, increasing urbanization has resulted in rising standard of living which has created new demands for milk products. With the marketing strategy already tailored to consumers' needs, the consumption of milk would register an

The future of India's dairying will be high-tech, although its base will continue to be in the hands of vast number of small rural producers, scattered across the country.

upward trend and at the same time give a better return to the rural producer.

Keeping in view the application of advanced technology to the dairy industry, the education and research institutions would have to be geared to meet the new challenges ahead.

The infrastructure so painstakingly created over the years in the field of

breeding, feeding, health care, processing and marketing across the country, together with the assured remunerative prices to the producer, have all contributed to the changing dairy scenario. To give further momentum to dairy development, the future of India's dairying will no doubt be high-tech one, although its base will continue to be in the hands of vast number of small rural producers, scattered across the country.

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The Sacred Cow!

The concept of 'sacred cow' — a part of India's cultural ethos since time immemorial -- stems from the many-splendoured benefits rendered by the cow to ease the burden of the poorest of the poor by providing subsistence benefits -- not just milk alone. It is literally his backbone. Even when not providing milk or draught power, the cattle fulfil the function of mobile 'thermal and chemical factories' in the form of dung, which serves both as fuel and manure.

A scientific study reported that the total efficiency of the desi cattle in terms of energy output amounts to 17 per cent. In contrast, a similar figure of the efficiency of the American beef cattle is estimated at 4 per cent. The reason of high efficiency of Indian cattle is not that they are particularly productive, but on account of the optimal utilization of all the products that come from cattle.

According to the National Council of Applied Economic Research (NCAER), cattle dung in India has a fuel value equivalent to 35 million tonnes of coal or 68 million tonnes of wood. An estimated one-third of the dung is used as fuel in rural houses, amounting to some 300 million tonnes of dung.

Another 340 million tonnes go back to the soil as organic fertilizer. The available energy from animal power is estimated at around 60,000 million kilo-watt hours, valued at between Rs 60,000 to 100,000 million from 70 million bullocks, 8 million buffaloes, one million horses and another million camels.

To generate this amount of energy by modern industrial processes would cost three times as much. It is estimated that animal power accounts for 66 per cent of the total energy utilised in India as against only 14 per cent from other conventional sources such as coal.

The contribution of the Indian cow to the survival of the rural poor in India is indeed significant. No wonder, she is regarded as 'sacred' and 'holy'! -- Extracted from Problems and Prospects of Cattle and Buffalo Husbandry in India with Special Reference to the Concept of 'Sacred Cow' by Dr Jurgen Lensch.

In Operation Flood will be recognized the farmer's struggle to achieve, against tremendous odds, not merely dairy development but also the dimensions of true development... by creating institutions at the village level that bring about not the development of the cow, but the development of man.

True Dimensions of Dairy Development

Dr V. KURIEN

Chairman, National Dairy Development Board

SEVENTY-FIVE per cent of India's population is engaged in agriculture. Most of them are small and marginal farmers and many are landless labourers who work on other people's land. They produce milk by feeding their animals on the by-products of agriculture. Even landless labourers keep one to two buffaloes or cows and feed them on crop residues and fodder they are permitted to collect from the edge of the fields where they work and from road-sides. In fact, with the growing pressure of human population, dairying has to be developed in such a manner as to avoid competition between man and beast for land and its produce.

[The pattern favoured for dairy development in India has been the cooperative pattern--the pattern followed by most advanced dairying countries of the world. The major difference, however, is that, in India, a single dairy plant is often supplied milk by a quarter of a million farmers, each owning one or two buffaloes or cows. Thus, in every village there is a milk cooperative society managed by elected representatives of the milk producer members and (in a district which has, say, 1000 villages, these village cooperative societies are federated into a district cooperative union, which owns and operates a dairy plant. Each district union is managed by a board of directors elected from amongst the chairmen of the village societies. There is a third level which is at the state level, where chairmen of district unions elect the board of directors of the state cooperative feder-

ation (and at the national level, the National Cooperative Dairy Federation of India.)

(Under "Operation Flood", over five million farmers have today organized themselves into nearly 49,000 village milk cooperative societies, which are federated into 168 district milk cooperative unions owning dairy plants, cattle feed plants, chilling plants, etc. These again are federated into 23 State-level federations/unions. Under the Third Phase of "Operation Flood" now started, it is proposed to increase this farmer membership to 8 million.)

(The benefits of the project have been clearly demonstrated. The cooperative dairies collected last December over 9 million litres of milk per day. Income to farmers has doubled. Over Rs 8,500 million are now paid by the milk cooperatives each year to the farmers for the milk they produce. The per capita consumption of milk in India has risen from 107 grams per head in 1970 to 154 grams per head in 1986. Milk and milk products which were rationed commodities in our cities and towns, are now easily available, though not yet at a price that the poor can afford. The only import into India is the milk powder and butter oil donated for "Operation Flood" by the European Economic Community. These donations have also now declined to 15,000 tonnes of milk powder and 5,000 tonnes of fat annually.)

Real Benefits: But are these the only benefits of a project as vast as this? Take any-

one of the 49,000 village milk cooperative societies and one will see some hundreds of farmers or their wives standing in a line at the village society to deliver the milk. They have to do this twice a day, every day of the year. They have learnt to stand in a queue irrespective of sex, irrespective of caste.

What does it do to a so-called untouchable, who is a member of the milk society to stand ahead of the high-caste brahmin because he came earlier, and to do so twice a day every day of the year? What does it do to a high-caste brahmin to stand behind an untouchable because he came after him? And what does it do to both of them to see the milk they brought going into the same can and the caste system getting submerged in the milk. Is this only orderly milk collection? Is this not a blow at the caste system?

Our milk collection centres are not all that clean but they are cleaner than the rest of the village. Someone has sprinkled water around it to try to keep the dust down. Some one has used an insecticide to try and keep the flies away. Someone is using sanitizers to wash the cans and measures. Someone has used glazed tiles to try to keep the place clean. These may well be the first few steps in rural sanitation in that village.

The privilege of collecting the farmers' milk places an obligation on the co-operatives to provide inputs to increase milk production. The district cooperative unions, therefore, not only have a dairy plant but also an elaborate veterinary service employing as many as 50 veterinarians in a district, and a first-aid worker employed in each village to take care of the health of the cattle. They are all employees of the cooperative and not of government. When a buffalo is sick, a cooperative, such as the one in Anand, guarantees that a veterinarian will call on the sick animal in the village within four hours of being sent for. There is an elaborate radio telephone communication system to ensure this.

When a buffalo is pregnant and nearing her calving period, she may suffer from dystokia when the uterus is twisted and the calf cannot be born. Everyone in the village knows that this has happened for generations and the owner will lose both the buffalo and the calf. Now they send for

with the help of a veterinarian. Delivery will be done safely
a vet--he lies behind the animal, untwists the neck of the uterus and delivers the calf safely. What does this display of modern medicine in a village do to the thinking of village people? Do they not say that when their son was sick, they tried to get a doctor but could not get one for four days and their son died? Do they not demand of their cooperative that there should be some provision for human health care?

There is a scheme under which the farmers' wives, who are the ones who take care of the milk animals, are invited to visit the central dairy plant as guests of the district union. What does it do to the simple village people when they enter the compound of a modern dairy plant, see the lush green lawns, the magnificent buildings, the gleaming stainless steel within, and to realise that they own a bit of it, that they have some say in the running of it and above all they have a share in its profits. When they go home that evening, do not they walk a little more proudly?

They are taken to their cattle feed mill where concentrate feed is manufactured. They are explained its working and are told that it contains 18 per cent protein. Do we not have to explain what is protein? Why the feed contains vitamins and minerals? Why a female buffalo should be fed even though she is dry, because she is pregnant and her foetus is growing which also needs nutrition? Can she not relate this to her own growing foetus? Are we discussing with her only animal nutrition? Are we not educating her on human nutrition also?

They are also taken to the artificial insemination centre. They only demand that there should be no male member from their village present. We show them how the semen is collected from a bull. We explain to them the mysteries of conception and birth. What is a sperm? What is an ova? The village women look through a microscope at live semen of the bull. Do they then not ask if this is what happens in human reproduction? Are we not leading them on to birth control?

Instrument of Change: What then is a dairy cooperative in India? What then are the true dimensions of Operation Flood? Is it not also the creation of instruments of social and economic change at the village level owned and directed by the rural people themselves? Is it not also involving

them in the processes of development, exposing them to modernity, dragging them into the twentyfirst century? Is it not the creation of an institutional structure that recognizes that true development is not the development of the cow, but the development of man.

True development involves the creation of an institutional structure through which the poor and the weak can give expression to their desires, make known their wants and demand for themselves a rightful place under the Indian sun. Is not our project a recognition that the biggest asset of India is its people, and if the power of our people can be unleashed and combined with professional management, which people like me represent, then this power assumes direction and thrust and makes all things possible?)

(Forty years ago, India could not manufacture even a safety pin. India today is counted amongst the dozen or so most powerful industrial nations of the world. What will India be in another 30 years? Is she not bound to fly her flag amongst the most powerful nations of this earth? But is it altogether a good thing for India or any other country to be all that powerful? Isn't it important to ensure that before India be-

comes that powerful, the power of India is not concentrated in too few hands? That those who wield the power of India should be truly answerable to the people of India, particularly the good people of India—the 75 per cent of our people, who live in villages, who live close to nature, who till the land and who want nothing but to live and let live.

Isn't it important to ensure that our democratic, secular form of Government in Delhi is underpinned with democratic structures like cooperatives right down to the village level in order to give meaning to democracy? Should not our people learn the value of their vote and understand the sound principles of democracy—one man one vote, and learn to exercise that vote freely, irrespective of sex or religion or region or language? Only then can we ensure that the power of the India of tomorrow is used not only for the good of India but also to ensure that India will hold aloft alongside her own flag, the flag of all just causes, of all oppressed peoples.

It is our hope that in Operation Flood will be recognised the farmers' struggle to achieve, against tremendous odds, not merely dairy development but also these dimensions of true development. ■



A Dairy Tale

The cow is a mammal and it is tame. It has six sides; right, left, fore, back, an upper and a below. At the back it has a tail on which hangs a brush. With this it sends flies away, so that they will not fall into the milk.

The head is for the purpose of growing horns, and so that the mouth can be somewhere. The horns are to butt with. The mouth is to moo with.

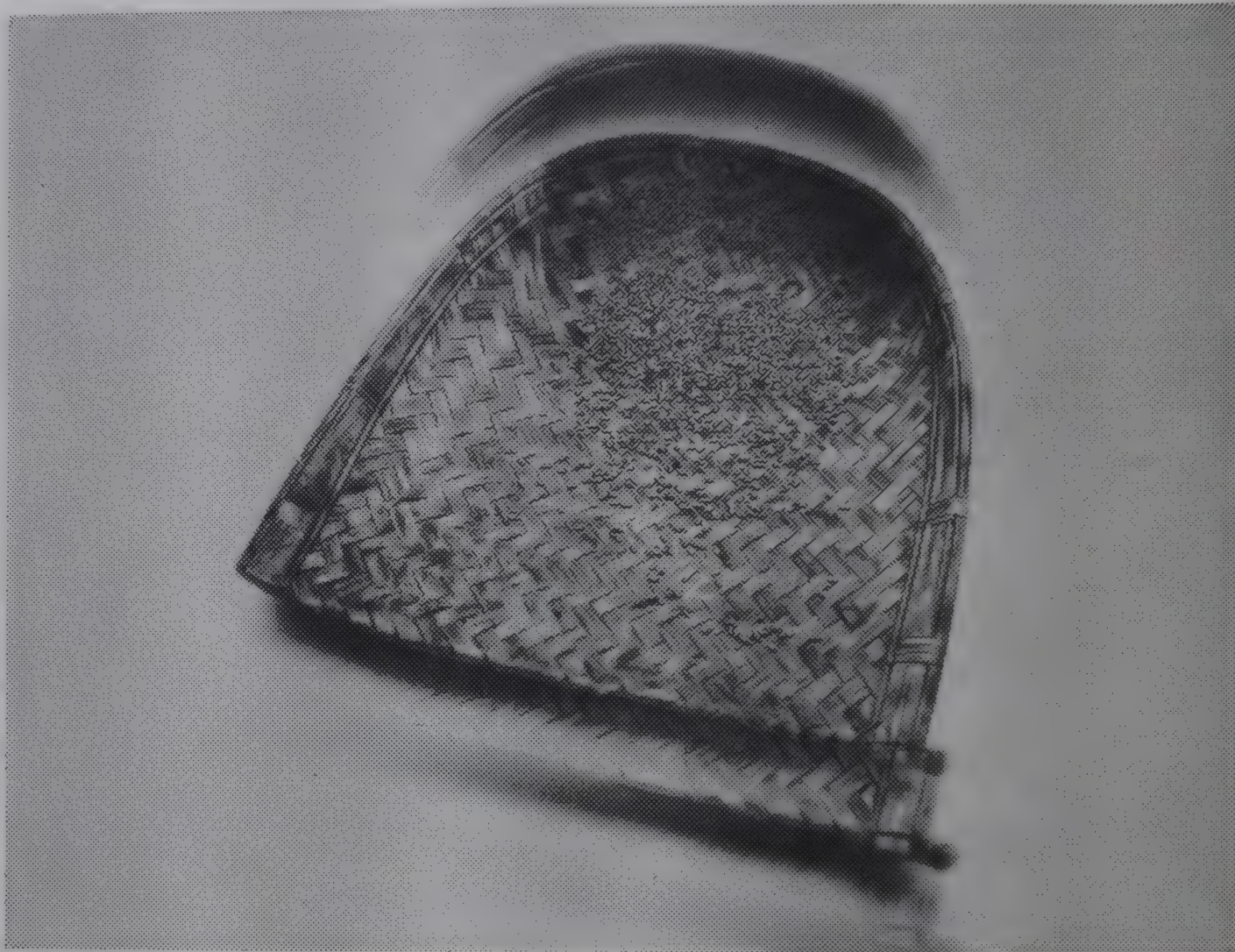
Under the cow hangs the milk. It is arranged for milking. When people milk, the milk comes, and there is never an end to the supply. How the cow does it

I have not yet realized, but it makes more.

The cow has a fine sense of smell. One can smell it far away. This is the reason for the fresh air of the country.

The man cow is called an ox, and it is not a mammal. The cow does not eat much but what it eats, it eats twice so that it gets enough. When it is hungry it moos, and when it says nothing, it is because all its inside is full up of grass.

—Schoolboy, 10 yrs



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Whatever one might say about the dairy scene in the country, it is clear that it is changing, and exciting things are expected!

The Changing Dairy Scene

B.P.S. PURI

President, Indian Dairy Association

MOTHER sustains her offspring through milk, which forms the basis of food in the human cycle. Man realised in early times that milk from other mammals, while not living upto the characteristics of human milk, was as complete a food as was feasible and available in nature. Thus man domesticated suitable mammals to provide him with milk.

The dairy scene, until recent times, consisted of a comparatively simple cycle. Man and milk animal lived close to each other. The milk produced was consumed in its fresh form or with simple processing. Extra milk was converted to short-term and long-term conserved products, which were consumed at convenience.

Urbanisation took the man and the milk animal away from each other resulting in the need for processing and packaging of milk and its products. In India, the first initiatives towards formalised processing were taken in the 'forties through military dairy farms and some years later through urban milk schemes.

Cooperativization of the dairy industry brought in an integrated approach to the dairy scene, wherein farmer organisations attempted to look at the entire process of production, transport, processing, conservation, packaging and marketing to give the status of an industry to dairying.

The last forty years have seen major changes in the route which is followed by

the milk from the animal to the final consumer. Greater changes are afoot. Whatever one might say about the dairy scene in the country, it is clear that it is changing and exciting things are expected.)

In this small treatise, I will attempt to put down an amalgam of the things which seem bound to happen.

Production: The importance of milk as a source of income to the producer is bound to increase production through breed improvement, better feeding, veterinary and health care. Cross breeding, artificial insemination, medicines, feed supplements along with the more recent developments such as embryo transfer will bring a snowballing effect to production enhancement. The social factor of pressure on land due to increasing population will turn more families to dairying as a commercial activity thereby improving not only production but also productivity.)

Quality: Prompt collection, chilling and transportation will improve milk quality. However, the basic tenets, namely, clean milk production, sanitized milk utensils and healthy animal should not be lost sight of in our quest for modernisation. Newer and technologically relevant systems of raw milk preservation e.g. lacto-peroxidase (LP) treatment will be tested and perfected helping in extending shelf life, improving bacteriological quality and reducing souring losses. More efficient milk chilling and transport systems will be developed.)

Processing: Processing until recent times has been limited to pasteurization for liquid milk and conversion to simple products e.g. skim milk powder, butter, ghee, baby food and ice cream. Exciting things have started to happen and will expand rapidly. UHT processing and aseptic packaging will increase the range and reach of value added milk and its products. Better quality dried milks will be produced for use in reconstitution and baby foods. Humanised baby foods, lactase treated products, acidophilus milk will be added to the range. Instantly soluble dry products will be in demand. Dahi and yoghurt type products will become available from organised processing plants. Ice Cream and frozen products will increase their market share. Cheese will become more widely available and in greater variety. Indigenous milk products will be produced more efficiently and hygienically and will become an important part of the market basket of the organised industry.

Processing will be aimed at value addition, market appeal, convenience of use and quality. Modified and engineered products with or without additives from the other agricultural commodities such as vegetable oils, cereals etc. will be developed. Packaging will play an increasingly important role and in association with new processing technologies will improve the marketing appeal of dairy produce.

Management: New challenges of increased processing capacity, diversification and marketing will require modernised management of the entire industry. Models will have to be developed for managing all aspects of the industry -- be it inputs for milk production or control of milk quality or processing efficiencies. Time required for bringing to production stage facilities such as cattle feed plants, liquid milk plants, product plants etc. will have to be cut. Resource management will be extremely important. Modern tools of management such as computers will be used widely.

Research & Training: Research and training institutes will become more responsive to the needs of the industry. Industry will begin to have a greater appreciation of such institutions to develop new products and processes. The training establishments will need to be strengthened at the fundamental level. On job training and re-education programmes will be essential to cope with newer technology. ■

✓ *Four Faces of Milk*

It has been suggested at the IDF Seminar on the 'Utilization of Dairy Ingredients in Foods' held in Luxemburg in 1981, that milk has four faces. The first two of these are represented by liquid milk on one hand, and traditional milk and dairy products on the other and little need be said about them except to underline the fact that they have contributed immeasurably to the health, nutrition and pleasure of mankind since they were first mentioned in biblical writings in about 1700 BC and that they form a vital part of the human diet in most societies throughout the world.

The third face of milk is of more recent origin and is represented by new milk and dairy products, tailored to suit the changing social and dietary habits of many people in different parts of the world which have encouraged the dairy industries of many countries to take a new look at the range of products which they produce and to examine the possibilities of producing and marketing new products. In this, they were aided by the arrival of new technological processes such as fat fractionation, electrodialysis and membrane separation, to mention only a few, which helped to further the concept of milk as an industrial liquid whose valuable ingredients could be extracted and recombined in different ways to form new products.

The fourth face of milk, as a generator of thousands of ingredients with specified functional and nutritional properties for different branches of the food industry, has also arisen out of the arrival of new scientific and technological processes. It could well be that the survival of the world's dairy industry in years to come will depend largely on our ability to exploit the potentials of this fourth face, which is revealing milk to be a treasure chest of some 2000 ingredients, many with unique functional and nutritional properties which modern processes are capable of isolating and refining for a multiplicity of potential users in the food and related industries.

— Dr Ernest Mann,
Consultant,

International Dairy Federation

India's experience of crossbreeding in cattle indicates that it should be taken up in milksheds of large consuming markets where inputs with respect to feed and health cover are available.

Experience of Crossbreeding in India

Dr R.M. ACHARYA

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CROSSBREEDING in cattle for increasing milk production has been in operation both in the organised farms and under field conditions in India since the beginning of this century. There are a number of issues, technical in nature, remaining unanswered in connection with the evolution of new dairy cattle breeds from crossbred base. An attempt has been made to answer these questions based on India's experience.

The evolutionary crossbreeding aiming at evolving new high-yielding and adapted dairy breeds from crossbred base would require decision on:

- the choice of exotic breed(s) to be involved in crosses;
- the choice of native breed(s) to be involved in crosses;
- the level of exotic inheritance from

- one or more exotic breeds; and,
- future breeding of crossbreds.

The results of the crossbreeding experiments in India indicated that the Friesian crosses performed the best, followed by Brown Swiss/Red Dane and Jersey crosses. The indigenous breeds did not make any serious difference. The physical environment and feed management did affect the relative merit of the different crosses.) The Holstein crosses were superior to other crosses in more comfortable environment.

In most of the crossbreeding experiments, curvilinearity of relationship between level of exotic inheritance and the mean of milk production traits was observed. The point of inflection was in general around 50 per cent level of exotic inheritance. Beyond this level, there was

either little improvement or there was a decline. This relationship is difficult to explain as theoretically through backcrossing with superior exotic breeds, there should be increase in the frequency of desirable genes for production available in the superior breed, and this would result in improvement in the mean performance. No study has, however, been carried out to analyse the reasons for curvilinearity of relationship between level of exotic inheritance and mean performance.

A decline in performance has been observed in F₂ relative to F₁. The decline, ranging from 23 to 47 per cent, was reported in Brown Swiss x Sahiwal crosses. The major reasons for a decline in F₂ relative to F₁ in Brown Swiss x Sahiwal crosses at NDRI, Karnal, was that the majority of sires used were inferior to the average of the F₁ population.

The decline in F₂ relative to F₁ is more due to lack of selection in F₁ and to some extent due to breakdown in F₂ of epistatic gene combinations present in parent breeds involved in crosses and contributed to the F₁. Appropriate selection of F₁, especially bulls, would lead to lowering of the loss from F₁ to F₂. To eliminate/reduce decline from F₁ to F₂, we should start selection in the F₁ generation itself.

In evolving new dairy breeds in tropics, the idea is to create a mosaic of desirable traits having superior additive genetic merits of the temperate dairy breeds for milk production and reproduction, and adaptability to high temperature, tropical diseases and poor feed quality of the tropical parent breed. It is important that in the initial stage of evolving a new synthetic breed, the effective population size is kept large to reduce the incidence of inbreeding and random genetic drift which may reduce the genetic variability and adversely affect the performance.

CATTLE BREEDING POLICY

The broad cattle breeding policy envisages:

- (i) Improvement in non-descript and low producing cattle in the milk sheds of large consuming markets where inputs with respect to feed and health cover are available, is to be brought through crossbreeding with exotic dairy breeds. The bulk

of the exotic inheritance is to be obtained from Holstein and Jersey, and is to be stabilized around 50 per cent;

- (ii) The important indigenous dairy, draft and dual-purpose breeds are to be improved through selection.
- (iii) The non-descript and low producing cattle in other areas are to be improved through grading with superior indigenous breeds.)

However, no serious efforts have been made in each state to define details of the breeding policy, area by area, purpose (milk, draft, dual purpose), approach (crossbreeding with exotic breeds, selection within indigenous breeds and grading with superior indigenous breed), improved breed(s), and level of exotic inheritance in case of crossbreeding with exotic breeds.

POPULATION OF CROSSBRED CATTLE

Till 1977, quinquennial livestock censuses did not record separately the crossbred cattle population. The livestock census in 1982 for the first time attempted to separately record the crossbred cattle. Table 5 gives the statewide number of crossbred and indigenous cattle under the young female stock, adult female stock and total adult cattle population. The introduction of frozen semen for the artificial insemination programme in the 'seventies further improved effectiveness of the crossbreeding programmes.

Kerala had the highest percentage (46.9 per cent) of crossbred population of the total cattle population in the state followed by Pondicherry, Sikkim, Uttar Pradesh and Haryana. Other States had crossbred population less than 10 per cent of the total cattle population. Majority of crossbreds in Kerala had involved Brown Swiss as the exotic breed and to a very limited extent Jersey. In other States, Friesian and Jersey were the exotic breeds used for crossing. The Census has not recorded the exotic breeds involved in crossing or the level of exotic inheritance. The latter would be rather more difficult to determine. However, in the majority of the pockets with large crossbred population the exotic inheritance would be higher than 50 per cent, as the majority of the crossbreds are inseminated with the semen of exotic breeds.

PERFORMANCE OF CROSSBRED

On the basis of the data available on the performance of crossbred cattle, both under organised farms and field conditions, it is possible to conclude that crossbreeding in cattle has resulted in increased milk production and helped to a great extent to rural development. This is also reflected from the breeding policy for improving milk production in cattle recommended by the Government of India and being followed by the various states, and from the fact that almost 10 million crossbred cattle are currently available. The relative performance of crossbred cattle vis-a-vis local cattle and buffalo was invariably better and the cost of milk production in crossbreds was lower than in local cattle and buffaloes. Further, the studies carried out at the National Dairy Research Institute (NDRI), Karnal, on the performance of exotic super natives, crossbred cows and buffaloes (Table 6) clearly indicated the superiority of the crossbreds in reproduction, milk production and efficiency of milk production in relation to dry matter intake and cost of milk production.

India's experience of crossbreeding in cattle indicates that it should be taken up in milk sheds of large consuming markets where inputs with respect to feed and health cover are available. Holstein is a preferred breed as its crosses produce more milk irrespective of indigenous breed and the ecology involved. The ranking of the exotic breeds in general has been Holstein, Brown Swiss, Red Dane and Jersey. The ideal exotic inheritance is between $1/2$ and $1/4$, more close to $1/2$. Decline in production on inter breeding of crossbreds is primarily due to the non-selection of crossbred males used in breeding rather than due to any large breakdown of heterotic gene combination. The crossbred cattle under field conditions have been maintained under very simple or little housing conditions and in general have been poorly fed than expected, according to their level of production. Yet their performance has been better than of local breeds and buffaloes. The potential of crossbred cattle is much larger than is being exploited primarily because of poor feeding.

TABLE 6. Performance of exotic, superior native and crossbred cows and buffaloes.

Character	Age at first calving (months)	First lactation milk production (litres)	Kg dry matter/litre of milk	Cost of milk production per litre of milk (Rs)
Holstein	30	3900 (6000)*	-	1.60
Jersey	28	2800 (4000)*	-	-
Sahiwal	40	1800	1.10	1.95
Holstein x Tharparkar	29	3450	-	-
Brown Swiss & Tharparkar	29	2900	1.09	1.26
Jersey x Tharparkar	28	2700	-	-
Murrah Buffaloes	41	1744	2.09	2.49

*Averages in their country of origin.

It is seen that out of 8.3 million reported population (1982 census) 20.32 per cent are young crossbred females compared to 21.67 per cent indigenous females. This will reflect that either reproduction rates are low in the crossbred cattle or young crossbred animals have high mortality. The percentage of crossbred cows in milk was more than the indigenous cows (57.66 per cent vs 44.00 per cent). This will reflect that the reproduction rate in crossbred cattle is rather better than in indigenous cattle. The lower percentage of young crossbred females relative to the indigenous cattle would probably be due to lack of proper management and feeding of growing females.

In Kerala State, Brown Swiss crosses had a lactation yield ranging from 1,144 to 1,727 litres compared to 491 to 600 litres in the non-descript and 833 to 1,333 in the case of graded cattle.

In Maharashtra, 305-day lactation milk production averaged $2,286 \pm 46$ kg in Holstein x local crosses and $1,696 \pm 35$ kg in Jersey x local crosses.

In Punjab, the average lactation production was 2,117.29, 915.65 and 1,461.10 litres respectively, in crossbred cows, local cows and buffaloes in farms predominantly maintaining cows; and 1,447.11, 895.58 and 1,725.96 litres respectively, in farms maintaining buffaloes. The average lactation yield in Holstein halfbred and 3/4 breds averaged $2,112.7 \pm 40.4$ and $2,194.4 \pm 43.8$ kg in farmers with land and $1,945.8 \pm 56.1$ and $2,001.1 \pm 80.7$ kg in case of landless farmers in the two crossbreds, respectively.

In Karnataka the Hallikar crosses with Holstein produced 1,919 kg compared to 843 kg in Hallikar.

In Haryana, the average lactation milk production was 2,210.80 litres in crossbred cows compared to 1,032.95 litres and 674.16 litres in buffaloes and local cows respectively.

These figures indicate the superiority of crossbred cows for milk production relative to the indigenous cattle and buffaloes under highly varied ecologies and variable management and feeding systems. The potential for milk production in crossbred cows is much larger than is being exploited under the present feeding and management

conditions. Holstein crossbreds can yield on an average 4,000 litres per lactation.

MAJOR CONSTRAINTS

The major constraints observed in crossbreeding of cattle for improving milk production are low reproductive performance through artificial insemination, prejudices against crossbred males as draft animals, inability to provide balanced feed, decline in milk production in interbreds and low price per litre of milk of crossbred because of pricing on fat percentage. The introduction of frozen semen technology for artificial insemination and more appropriate infrastructure for artificial insemination, specially more closer to farmers' home, have improved the performance of AI. However, there is still scope for increasing conception rate through timing of insemination and improving the hygienic conditions and techniques of insemination.

The prejudice against crossbred males as draft animals is reasonably unfounded as most of the crossbreds, specially halfbreds, have been observed to perform better than the indigenous males because of their size. Except in higher grades, the crossbred males can be utilized for draft purposes. The lack of hump would require slight modification in the yoke. Possibly the crossbred males could be utilized for work during relatively cooler hours of the day. Thus in terms of efficiency of feed in relation to work the crossbred males are not inferior to indigenous males, specially for slow and steady work.

Failure to provide adequate feed specially to growing female calves, cows in advanced pregnancy and lactating cows results in poor performance in growth, reproduction and milk production. It is essential that the technologies available for improving feeding value of low quality roughages and crop residues such as ammoniation, using urea supplementation in small quantities with green fodder and supplemental bypass protein are utilized. Utilization of agro-industrial byproducts for developing cheap and balanced livestock concentrate feed would further help in improving nutritional status of the crossbred cattle and consequently their reproduction and production.

The decline in crossbreds through interbreeding is a major problem impeding the progress of milk production through crossbreeding. Such a decline is more due to non-selection of crossbred males rather than due to breakdown of heterotic gene combinations.

Normally, it is unwise to confine work of evaluation of new breed to one herd except in the early stages. At least 10-15 sires should be tested annually. This would require a large breedable cow population to serve as dams in progeny testing programme and part of the population subsequently serving as bull mothers. In the initial stages of breed formation it is important to have a large effective population size to reduce the inbreeding. It has been recommended that a minimum of six sires be used each year and a minimum of 5,200 performance recorded cows be utilized in the progeny testing programme.

Doubts have been raised on the effectiveness of progeny testing programmes under medium to low feed environment, unless the sires are compared on a within year basis and the number of progenies per sire are 10 or more. These conditions are difficult to be met with in single herds or small popula-

tions. It may be recommended that more attention be therefore, directed to selection of cows which could be used as bull mothers. The sons of the best cows should be reared and utilized for breeding not more than two years so that the inbreeding is minimised. This will be particularly true in small herds/population. The multiple ovulation embryo technology can be used for more rapid multiplication of elite females which could be used as bull mothers. The semen sexing, embryo sexing and cloning may further help in increasing genetic gains and should be considered seriously.

The pricing of milk on the basis of fat percentage rather than on the basis of total solids is discriminatory to cow's milk. Efforts have been made to institute double axis milk pricing policy wherein not only fat but solids-not-fat are to be considered for determining the price of milk. Only in the state of Maharashtra cow's milk has been priced competitively with the buffalo milk and this had led to a large impetus to the crossbreeding programme. ■

(Extracts from a paper submitted to FAO Regional Office, Bangkok.)

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In considering any demand projections for milk, one cannot ignore the requirement of nutritionally vulnerable groups, which is critical and must be provided for.

Milk for Vulnerable Population

Dr K.K. IYA

*Retd. Deputy Director-General (Animal Sciences),
Indian Council of Agricultural Research*

MILK and milk products are generally included as one of the subsidiary agricultural commodities when planning for or projecting their demands. In such cases, the word "Agriculture" embraces not only crop production, but also horticultural production, fibre crop production, besides animal husbandry, dairying and fisheries production. However, when dealing with the crop production, particularly cereal crop production (mainly rice and wheat), a detailed ramification of production, agronomy, soil fertilizers, pesticides, irrigation and post-harvest technology are discussed in threadbare detail.

Animal husbandry with all its animal species specialisation or discipline specialisation including poultry, meat, fibre production, fisheries and other commodities which are nutritionally and economically extremely important receive only "residual" consideration and passed over in a hurried manner as if it were of minor significance. Even in national and international organisations such as Indian Council of Agricultural Research, Planning Commission and Food and Agriculture Organisation with a research and developmental orientation, unfortunately, such a broad use of the term "Agriculture" acts to the distinct disadvantage of all other branches except crop production.

This disadvantage is particularly marked in the case of multifaceted animal production. For example, our dairy industry has a

turn-over of about Rs 9,000 crores annually (1983-84) and benefits directly and indirectly millions of farmers producing milk in rural areas and an equally huge urban consumer population. In fact, in gross output value, milk ranks second, next only to rice with a value of Rs 18,000 crores and wheat occupying third place with an output of Rs 7,500 crores.

MILK ESSENTIAL FOR NOURISHMENT

Milk is nature's ideal food for infants and growing children in our country, except in rare cases of lactose intolerance. The important place milk occupies in our diet has been recognised since Vedic times, and all modern research has only supported and reinforced this view. In fact, milk is now considered not only desirable but essential from the time the child is born. The baby is recommended to be breast-fed until it is weaned and thereafter given cow/buffalo/goat/sheep or similar domesticated mammal's milk till he or she reaches 12 years of age.

The National Institute of Nutrition has recommended a minimum of 300 gms daily intake of milk for children between 1-3 years of age and 250 gms for those between 10-12 years, if they are vegetarian, and 250 gms and 200 gms for the same age groups of non-vegetarian children.

Normally, growing adults may or may not consume milk. In our country, most such adults consume milk only as whiteners for tea and coffee, some dahi or buttermilk, or

on special occasions in desserts, sweets etc. However, three categories of nutritionally vulnerable adult population are excluded: (i) the pregnant and nursing mothers; (ii) old age group say over 60 years; (iii) sick and convalescing patients. For all of them, milk should be considered as an essential item of nourishment.

NUTRITIONALLY VULNERABLE GROUPS

In considering any demand projection, one cannot ignore or brush aside the nutritionally vulnerable groups' requirement which is critical and hence must be provided for by government.

The growth or financial aspects of the entire agricultural sector, particularly of the dairy sector, loses its relevance if the priority-critical-demand of the nutritionally vulnerable group is not effectively met in a planned and systematic manner. Towards this end, the help and cooperation can be obtained of the public distribution system, using infrastructure institutions such as organised dairies, primary health centres, schools, hospitals and other voluntary, government and cooperative institutions.

The people so affected constitute a large group estimated at more than 250-300 million by 2000 AD—30 per cent of our total population. Also, this group will not have the financial means to pay for their requirements of milk. Yet for that reason alone, one cannot afford to forget the obligatory nature of this demand. We need to gear ourselves and our institutions so that at least by 2000 AD we will have worked out a system by which this large neglected group of our population can be assured even in a phased manner, the supply of minimum required intake of about 200 ml of milk per capita (skim, toned, low fat, whatsoever type).

The estimated cost of milk at Rs 4 per litre for this demand at its peak value works out to about Rs 6,000 crores per year (at current prices) which is not very large amount if one reckons that 24 states are involved and five or more central and state ministries will have fulfilled their avowed objectives, if the amount is shared for this obligatory priority demand. Even with the best expectations from poverty alleviation programmes, the number of those who need this vital food and who will not be able to buy it with their financial

resources is not likely to decrease. It would be wise to plan at covering at least 250 million people.

The proposed outlay may be considered as a subsidy for essential nutrition of the critical group. It will be productive and of tremendous long term gain and hence constitute an important social welfare objective. In reality, this will be a means of human resources development. There can thus be two categories of demand: (1) High priority social obligation demand; and (2) Economically viable and market-oriented demand.

In the first category, the question of ability to purchase milk becomes a minor consideration, because milk must be supplied to them in order to ensure their survival, minimum health and productivity. Socially conscious welfare programmes must ensure guaranteed supply to as large a segment of this category as is possible. The second category must learn to purchase even at some higher prices to stimulate production, to pay for welfare supply and for their own needs.

PRACTICAL APPROACH NEEDED

A new practical approach must be made to the demand projection for 2000 AD for policy decisions to be taken in regard to (a) production targets; (b) distribution priorities; (c) pricing and government expenditure to be provided for priority category's supply of milk and milk products; and (d) pricing and marketing strategies for all other categories.

Assuming a population of 1,000 million people in 2000 AD in our country, as many as 60 per cent may not be able to afford the purchase of milk or milk products at the then prevailing prices. In this group, some 40 per cent can be included in the categories of (a) pregnant and nursing mothers; (b) children of 1-5 years of age; (c) children of 5-10 years of age; (d) old people of 60 years and above; and (e) sick people at home or in hospitals. All these will number almost 250 million people who can be classified as the nutritionally vulnerable group and who will not be expected to have economic capability to purchase the minimum needs of milk and milk products. They will utilise 15 million tonnes of milk annually less than 30 per cent of the targeted milk production of 65 million tonnes.

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AMRUT OF THE GODS

The Churning of the Sea

Once upon a time, whilst wandering the earth, the Holy Sage Durvasa offered a celestial garland to Lord Indra, bequeathed to him by a nymph.

Lord Indra placed this garland on his elephants head, which the animal flung away in a fit. Angered by this act, Durvasa cursed Indra and the other Devas, who lost their vitality and were conquered by their enemies, the Asuras.

Moved by their plight, Lord Vishnu advised the Devas to churn the sea, along with the Asuras. The nectar which arose from this churning would help conquer the Asuras.

Apart from the jar of Nectar, amongst the many gifts which arose from the churning was the divine cow... which has given the beneficial gift of it's milk to humankind. Let's glimpse at some of its properties:



The Ayurvedic Facts: It is an ideal nourishment for all, foremost amongst the rejuvenators and vitalisers; promotive of oja - vital essence; used in Ayurvedic medicines; relieves fatigue; is cooling and refreshing.

Modern Medical Facts: Is close in composition to mother's milk; ideal for keeping slim and trim, since it contains 56 cal./100ml.; easier to digest; contains vital carotone - highly beneficial for eyesight; contains Tryptophan to help you sleep soundly.

There's no milk like cow's milk!

Marketed by:
Greater Bombay
Milk Scheme



India today processes over 10 million litres of milk everyday — a figure which is rising at the rate of 20 per cent every year. In another five years time, we should be handling 20 million litres of milk everyday.

Quantum Jump in Dairy Processing

Dr R.P. ANEJA
Managing Director, Indian Dairy Corporation

INDIA today processes over 10 million litres of milk per day—a figure which is rising at the rate of 20 per cent every year. In another five years time, we should be handling 200 lakh litres of milk every day. It means that the task before us is to achieve a level of milk processing that we have achieved in the last 40 years, over the next four to five years. This is a quantum jump and there is a need to look at the recent advances in dairy processing. What it also means is that we can have the benefit of the many advances that have been made in the field of dairy processing for the next 100 lakh litres of milk that we are going to handle during the Seventh Plan.

The country today markets some 65 lakh litres of milk as liquid milk in nearly 200 towns and cities in the country and produces some 120 thousand tonnes of milk powders. These figures are likely to double over the next five years. Even though there has been widespread drought in the country during this year, we don't see the scarcity of milk that would have normally followed such a drought. This is largely due to the fact that we have been able to conserve our seasonal surpluses and build a minimum level of buffer stock of dairy commodities to see us through such scarcity. Our milk production which is largely confined to the conservation of the surplus milk in the flush season is likely to go up to 2,50,000 tonnes under Operation Flood III.

In fact, last year, we were faced with a problem of "Surplus Milk" which fortunately for us turned out to be only a minor "hiccup" on account of our marketing efforts lagging behind the procurement and production inputs.

(Reviewing the recent advances in dairy processing, one should look at the ways and means of increasing efficiencies, minimizing energy inputs, and maximizing returns to the milk producers so as to ensure not only adequate returns to them but also provide them an incentive to produce more milk. In the ultimate analysis, the consumer is the king and we have to ensure that we make use of the technologies that are now available to us for maximizing consumer satisfaction.)

(In the area of marketing of liquid milk, flavoured milks, evaporated milk, cream etc, our biggest opportunity seems to be UHT treatment and aseptic packaging. This technology is ideally suited to the requirements of our country where the cost of maintaining a cold line is high, and the opportunities of marketing milk and milk products throughout the length and breadth of the country using a cold chain are rather limited. The aseptically-packaged, UHT-treated milk has finally caught up with the imagination of our dairymen and the consumers. This is technology of the future, and it can be used judiciously along with the bulk vending and other modes of distributing milk.) It is gratifying

that the initial problems with the absorption of such a technology have been overcome, and our dairymen are now able to successfully deal with the high technology involved -- which has in fact helped us upgrade the level of dairy technology in the country.

(It is not possible to produce a good product from bad raw milk. We have, therefore, to look at the quality of our milk and find ways and means of improving it right from the point of milk collection in our villages. Electronic machines are now being used to test the quality of milk at the village level. But more testing of fat and SNF will not do. We have to look at the bacteriological and organoleptic quality of our milk so as to ensure that we have milk with all the 'freshness' in it.)

PRESERVING FRESHNESS & FLAVOUR

(Although all of us are fairly familiar with the technology of milk concentration and the production of milk powder, the technology in this area has so far been lagging behind. Now that we have enough milk for processing, we must look at the quality of our milk powders. It is common for us to hear that the recombined milk that is put out by the dairy plants smells of "powder" and lacks in "freshness". Both the quality of our milk powders and techniques of recombination can be improved substantially. Already in this area, modernisation of our powder plants is taking place, and newer technologies for the manufacture of high quality milk powders are being introduced. The requisite automation required for sustained production of quality powders is now being introduced.

These technologies will not only improve the quality of milk powder and quality of milk put out by dairies, but also reduce the energy requirements of making milk powder. The cost of producing milk powder is also expected to be minimized.

The quality of ghee put out by our dairies can be further improved in terms of flavour, texture and keeping quality. Although many newer technologies have been developed in this area, very little has been achieved in applying these technologies. The newer technologies will not only help us improve the quality of ghee, but also reduce energy requirements of the processes involved. This is a weak area,

and concerted efforts should be made to develop a continuous ghee-making process. Let us enable the industry to produce as good a ghee as our villagers have been producing for ages.

As to the manufacture of indigenous dairy products, somehow, I get a feeling that our dairy scientists are not very enthusiastic about working on the indigenous dairy products -- may be for lack of glamour, and I suspect, in some cases, the fear of being branded as "traditional". This is an area where it has been successfully demonstrated that modern technologies can be applied to the advantage of both producers and consumers. In fact, more milk is converted into traditional dairy products than what is handled by the organized dairy industry. This is where money is! There is not much money in marketing liquid milk or making milk powder and butter. And this is the area of the organised sector, while the traditional trade has been banking upon traditional dairy products and taking fat.

There is not only a need for newer technologies in this area, but also the application of technologies already available to the general food industry extended to the dairy industry. After all, we have made shrikhand by using quarg separators, gulab-jamun by meat ball forming machines and doughnut friers, and we now have UHT lassi!

Some of the recent advances in the field of reverse osmosis and ultra-filtration can be used not only in the area of milk concentration but also in the area of indigenous dairy products like khoa, shrikhand, paneer etc.

Now that we have adequate milk, let us develop the desired technology. The application of such technologies has to be well planned, and for that we need figures and statistics. We do not have figures on the utilization of milk in the form of liquid milk, ghee and other products over the last 20 years period. We need these figures to plan the application of technology to meet the demand for various types of milk and milk products. We are now entering an era of plenty in milk production. Marketing needs greater emphasis and must be supported with the many technologies that we can tap -- for the benefits of our milk producers and consumers.

Buffalo, which accounts for more than half of India's milk production, has a special role to play in the dairy development in the sub-continent. Its potential, however, still remains to be exploited fully.

Buffalo Productivity

Dr R. NAGARCENKAR

Director, National Dairy Research Institute, Karnal

OF the total world population of around 125 million buffaloes, nearly 85 per cent are predominantly in Asian countries. In India and Pakistan, the dairy industry essentially depends on buffalo milk, and thus this species has a special role in this sub-continent. India has a population of nearly 62 million of river buffaloes which are essentially milch type animals.

The various programmes of organized dairy development have stimulated growth of buffalo population in dairy-surplus states in the country. As against an increase of 0.13 per cent in case of cattle, the buffalo population has been increasing at the rate of 1.3 per cent annually during the last one and a half decades of stimulated organised dairy development. Around 70 million farming families are involved in the production of milk and other animal products. Eightyfive per cent of our farming families possess two or three animals, and the average marketable surplus of these farming families is hardly 2 to 4 kg milk per day.)

The enormity of the problem can well be judged when programmes of development in animal production have to be implemented under such prevailing conditions. This situation is not only unique to India but to many of the countries of Middle-East and Asia. In spite of artificial insemination for dissemination of superior germplasm, the population of cattle or buffalo that is

covered by AI, is still negligible. The all-India average of animals bred by AI has reached around 20 per cent. This is so in spite of the fact that nearly 5,500 AI centres have been established in the country in various parts, besides nearly 50 semen freezing stations. Thus, a large majority of the buffaloes are still bred naturally.

AI Programmes: Adequate progress has been made in developing suitable diluents not only for extending the semen and preserving in chilled state for two to three days, but also for freezing of semen successfully. One of the most successful extenders found in making frozen breeding doses of buffalo has been egg-yolk-trisglycerol. On the first insemination basis, this has also given as high as 40 to 50 per cent conception rate which is nearly 5 to 10 per cent superior to that obtained with the use of chilled semen both in the institutional herds or in the field conditions due to perhaps lesser handling of semen and better semen being used for freezing.

In spite of this breakthrough in successfully freezing and cryo-preservation of buffalo spermatozoa, sire evaluation programmes have not made any impact in the country except in few organised herds. This is so because of lack of appropriate infrastructure in the field for the performance recording. Many developed countries in the world have been able to more than double the milk production in different breeds

with the adoption of sire evaluation. The progress has been faster after the wide-scale use of frozen semen doses of elite bulls, in which an international trade is lately increasing.

In the organised cooperative structure, a national milch herd is being established under the aegis of the National Dairy Development Board. A beginning is also made to implement the programme of periodical recording and sire ranking by dissemination of germplasm of superior young bulls and generating future younger bulls through contract matings.

In its herd life, a buffalo will leave behind hardly one female off-spring as a replacer since it can produce only two or three calves of which one or two could be of other sex. The biological limit for genetic improvement per annum is around 1.8 with the methodology as delineated earlier. The breakthrough in super-ovulation, embryo harvesting and cryo-preservation and subsequent embryo transfer can increase this genetic progress almost four times. The researches in the laboratories on embryo sexing and cloning have potentialities of further enhancing the genetic progress and exploiting the buffalo females for the welfare of our farming community. Certain breakthroughs have been achieved in formulating protocols for inducing super-ovulation in the species which does not respond as well, as does the cattle.

Export Potential: Meat export industry today is valued at Rs 75 crores annually. Buffalo broiler contributes substantially, although the full potentialities of this has not yet been exploited. Under well conducted experiments, it has been observed that the buffalo calves can attain a growth rate of 700 to 1,200 gms per day from birth to 14 months of age. Buffalo broiler, if reared up to 14 to 18 months of age on proper diets consisting of appropriate least-cost mixtures of roughages and concentrates, can reach a body weight of 250 to 300 kg. The dressing percentage of between 55 to almost 60 per cent has been obtained in such broiler buffaloes.

In countries like Australia, Bulgaria, Egypt, Italy and Thailand, the buffalo meat industry is being better exploited and is gradually developing into an export trade. There is tremendous scope in India especially in view of the fact that we have the

largest population of buffaloes in the world to enhance meat production from this species. However, the male calves are allowed to die at a very early age mainly due to starvation and neglect.

(India has nearly eight million working buffaloes. As a draft animal, it is a very important species in South-East Asian countries where almost 95 per cent of the farm power is derived from the buffaloes. They are specially valued because of their ability in puddling rice fields under waterlogged conditions. Buffaloes are also used for carting, threshing, drawing water for irrigation, for extraction of sugarcane juice for gur and Khandsari preparations.) An adult single healthy buffalo bull is estimated to have a working capacity of around 0.75 h.p. A sturdy single buffalo can pull a weight of 0.9 to 1.0 tonne which is almost the same as its own weight. On a good road, a pair of buffaloes can draw a weight of up to two tonnes especially in a pneumatic-tyred cart, although no special yokes have been designed and the present ones are considered defective.

Thus, buffalo is a veritable triple purpose species for milk, meat and draft. Its potential still remain to be exploited fully.

USING THE YEARBOOK

You will be surprised at the many, varied ways in which this Yearbook can be used by you. A handy databook-cum-directory, it is classified conveniently for quick, easy reference.

Looking for an address, or a phone number? Or perhaps a farm, a feed company, an equipment manufacturer, a pharmaceutical company, a marketing agency, or a government office? Check the table of contents in the opening pages or the Advertiser's Index. Also, consult the Buyer's Guide to various products and services.

Advertisements in this YEARBOOK themselves serve as a Who's Who of the industry. They serve as the manufacturer's catalogue and supplement the basic data given in the various listings.

Today, an increasing number of milk and other beverages are relying on the aseptic packaging system, which does not require refrigerated storage. This one single trait coupled with extended shelf life results in significant reduction in marketing costs.

Spreading the Great New Taste

S.N. PRAHLAD

General Manager (Technical), WIMCO Limited

THE year 1987 may well become memorable in the annals of dairy development with the addition of a new dimension to marketing of milk and milk products. The entry of the compact, sterilized, pilfer-proof, non-breakable, and long shelf-life Tetra Brik pack on the Indian dairy scene promises to give a new thrust to the marketing of a wide-range of dairy products, which awaited such a technological breakthrough. This new aseptic pack retains the freshness and flavour, plus all the goodness of milk, for at least 90 days, thus extending the shelf-life of milk which is normally of only a few hours. Offering many other advantages over the traditional bottle, the most significant aspect of the new system is it does not require refrigerated storage and can be stored at room temperature. This one single trait results in significant reduction in marketing and distribution costs. More important, these products become grocery items.

The basic stumbling block in the way of their large-scale commercial marketing has been the limited shelf-life of a long line of dairy products including cream, curds, evaporated milk (unsweetened condensed milk), cheese dips, spreads, etc. Now, with aseptic packaging, the situation has changed. Before long, a stream of dairy products will take their due place on the shelves of local grocery stores.

Today, a variety of brand names—Choco-shake, Elaichishake, Goodness, Great Shake,

Frooti, Appy, Volfruit, Jive, etc—have proliferated the market, dispensing milk and fruit drinks in popular flavours, and their number is on the increase. ^{They are increasing} All these drinks rely on the aseptic packaging system, now widely used in the country. The drinks in the new pack come in compact, brick-shaped containers. So, they are commonly known as Tetra Brik, a registered trade mark.)

An index of their popularity can well be judged from the fact that 200,000 packets of chocolate milk drink were sold within four days of its launch by the Tamil Nadu Cooperative Milk Producers' Federation, bringing in a sales turnover of Rs 500,000. This was so despite the fact that a 200 ml packet at Rs 2.50 was priced at 90 paise more than its bottle counterpart. Similarly, Parle in Bombay turns out 200 Frooti packs a minute and is all set to commission four more plants in other parts of the country.

One quality of the new package that has appealed to consumer the most is its convenience—first and last: conveniently safe, non-refrigerated storage, non-breakable, non-returnable, available all time in grocery stores. No need to queue for milk twice a day and no frequent boiling—what a relief for the working housewife!)

This development is both timely and topical keeping in step with the lifestyle of a generation that has taken to the fast food culture. With the entry of flavoured

milk and fruit juice drinks in convenient aseptic packs, the fun drinks also serve as health drinks! Again, this meshes with the new wave of "fitness" and "in shape"—the buzzwords of 1987.

Fortunately, the love of milk and awareness of its nutritive goodness have been the part and parcel of the mental make-up of people in the country since time immemorial. Now, the combination of healthy products and innovative packing technology preserves nutrition for a wide range of milk and milk products.

And the market pie is sizable, too. The annual turnover of the soft drink market is estimated at Rs 400 crores. Of this amount, the carbonated "fizz" drinks alone account for Rs 350 crores, while juice concentrates and squashes account for another Rs 50 crores. At an annual growth rate conservatively estimated at 15 per cent, this market would reach the level of Rs 600 crores in another five years. So far, one constraint that has been holding back the rapid growth of fruit juices and milk drinks is the high cost of canning. But, now, with the new aseptic packaging, the situation has changed in favour of milkshakes and the like. Thus, the seasonal surplus in milk production can be profitably diverted to make value-added products.

ASEPTIC PROCESS

The heart of the new technology is the Ultra-High-Temperature (UHT) processing that preserves milk and other liquid products by subjecting them to brief but intense heating. The UHT process has come to be accepted as the most effective treatment for milk preservation. In the commercial practice employing this process, milk is sterilized at 135°C for 2.5 seconds in a continuous flow with subsequent aseptic packaging. A wide range of packaging materials has been developed for the UHT system and include paper, metal, and plastic laminates or co-extruded film to reduce oxygen permeability which otherwise causes the contents to go rotten. The aseptic packaging uses multi-layer laminate. Packaging is accomplished in an atmosphere of sterilized air to eliminate any risk of contamination.

In the actual process, the specially-treated paper is fed in the assembly line which takes the shape of a tube into which the liquid is filled and measured, after

which the packs get sealed and cut automatically. The process is a continuous one—form, fill and seal (FFS)—in which the liquid contents come in contact with all materials, including air, which is sterilized. Hence, the contents inside the pack remain fresh, and shelf-life of the otherwise perishable drink is extended. Perhaps, this is the biggest benefit of this new system for a country like India where high room temperature are generally the rule. In the marketing of the UHT milk, the 'cold chain' becomes superfluous, permitting significant saving in distribution costs. Thus, the UHT process is energy efficient.

Hitherto, chilling has been one way to extend the life of milk for a few more hours, followed by pasteurization which was introduced in India in 1950 and saw the era of the milk bottle. However, in the marketing of pasteurized milk considerable difficulties are being faced due to techno-economic factors such as erratic electricity supply, breakdown in the maintenance of refrigerated systems and finally, lack of domestic refrigerators in many urban homes. Thus, the UHT process holds promise of transforming the milk marketing in developing countries by making milk and its products as grocery items. Consequently, milk vending may go the way of the almost forgotten milk ration card.

The UHT technology came for the first time in India from Tetra Pak, the Swedish company which pioneered the development and commercial introduction of sterile milk in aseptic packages. In May 1983, the first commercial consignment of Tetra Pak milk under the brand name of "Amul" was marketed in Bombay in tetrahedron-shaped, blue-and-white specially-treated paper carton. Its shelf-life was 15 days. With modifications in the technology came the Tetra Brik packaging, dispensing fruit drinks and milkshakes—the former in July 1986 and the latter in October 1986.

The aseptic pack itself is a sturdy one-time use, non-returnable container, serving the purpose of a bottle. Its top has an identifiable inlet for a straw to pierce through it so that one can consume the drink directly from the pack, without greatly disrupting the sterilization chain so painstakingly imbued into the liquid. A special kind of straw with wedge has been designed for easy piercing of the top of the aseptic

carton. The conventional glass bottle has a tin cap which can attract rust on it as well as on the neck of the bottle. The contents in aseptic packs are totally safe from this angle.

The new pack eliminates all the botheration in terms of accountability of bottles, their re-cycling, storage of the empties, their washing, etc. Further, it is both compact and light, requiring minimum space. One truck load can carry five times the amount of drinks in Tetra Brik as compared to bottles--450 crates (each of 24 bottles) vs 2,000 cartons (each of 27 packs).

Since the pack is a disposable container not required to be brought back to the factory for re-cycling, it can be distributed to the far corners of the country from a central point. Thus, the high-cost technology of aseptic system is balanced out by the ease of its marketing. Notwithstanding the many obvious advantages of the Tetra Brik and similar packaging systems, even their most fervent supporters recognize that bottles will not disappear from the marketing scene. They would certainly expand the existing market for bottled non-carbonated drinks in general and milk beverages in particular.

CHOCOLATE CRUNCH

(Among the many emerging dairy-based/related products, the one to enjoy much attention from both consumers and producers is the chocolate.) Although promoted as health snack or a handy dessert, it is more often than not an impulse buy and that, too, as a gift.

The impulse must be quite strong, because an estimated 10,000 tonnes of chocolates are sold in the country every year to make it a Rs 600 million industry. Further, this impulse is stimulated through well-orchestrated advertising and sales promotion, of which attractive packaging, distinctive taste and flavours and good value for money are the hallmarks that result in the brand loyalty. That the potential for growth is enormous may well be judged from the fact that the per capita availability of chocolate is barely one 50 gm bar per month, and the annual rate of growth is 15 per cent. Cadbury's have reportedly increased their sales by 25 per cent in 1986.

The two big giants in the country are Cadbury's and Amul, while two new entrants are Mangalore-based Campco (Central Arecanut & Cocoa Marketing & Processing Cooperative) and Apte Enterprises of Pune which have taken over the Dr Writer's. The Campco with its thrust towards low-cost, rural-oriented market, have plans to capture 20 per cent of the existing market, presently confined to 650 urban centres in the country. Its aim is also to go beyond this market and make the chocolate an affordable luxury among the masses.

Apte Enterprises have entered into collaboration with Jacob Suchard of Switzerland, famed for their "Toblerone" chocolates. Their new factory near Pune has gone in production. Their aim is to have 10 per cent market in 1987. The Cadbury's are not silent. They are adding a Rs 20 crore new chocolate factory at Malanpur in Madhya Pradesh to supplement their production at the existing two factories in the Bombay-Pune area. The new unit is scheduled to be commissioned in 1988.

With this changing scenario, the chocolate market is bound to expand rapidly, and it is estimated that by 2000 AD, the annual production may cross the 25,000 tonne mark, valued at Rs 150 crores at the 1987 prices.

Although stakes are high in terms of market growth potential, demand for products such as milk drinks and chocolates call for the setting up of a basic marketing infrastructure, accompanied by imaginative sales promotion and advertising. For example, Amul, Aavin, Goodness, Godrej-promoted Noble Soya House and Parle's have reportedly spent an estimated Rs 20 million on the launch advertising alone of their new products--milkshakes, soya milk and fruit drink in aseptic packs.

Among giants can a newcomer hope to survive? Seems not, but profit-making opportunities can be tapped by the enterprising who can identify gaps in the market place and so "position" his product for maximum sales. His aim is not to 'sell' but 'market' products to meet the needs of his customers who may not be able to articulate their desire because it is in their mind. As has been put by the founder of famed Revalon cosmetics: "In the factory, we make cosmetics. In the store, we sell hope". ■

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of excellence
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Ashok Leyland

The introduction of Tetra Pak aseptic packaging has added a new dimension to milk marketing in the country. A component of Operation Flood, this type of packaging has helped India's bold, far-reaching efforts to achieve self-sufficiency in dairying.

Packaging that Competes with Mother Nature

ANTHONY BAIN

International Public Relations Officer, Tetra Pak, Switzerland

EVEN some of the most aggressive and committed suppliers of packaging systems for the Indian milk market will concede that the milk glands of mammals provide the best-quality milk! That leaves a great many contenders for second place: sachets, bottles, cans, and cartons for the liquid product, and, of course, a variety of containers for milk powder which must then be mixed in clean containers with clean water. The trouble with Mother Nature's winning entries is that:

- they come attached, somewhat inconveniently, to large four-footed animals;
- quality of milk may be good, but not of a consistent standard;
- quantity of milk varies with seasons.

The trouble with most second-place contenders (that is, man-made packages) is that they:

- require quick distribution and consumption, and/or;
- need refrigerated storage and distribution;
- allow milk to be damaged by ultraviolet light;
- necessitate costly collection and cleaning of empty containers.

Similar difficulties prevailed in Europe, particularly after the chaos of World War II. However, the discovery of adhesion and barrier properties of polyethylene wrought tremendous change in a very short time. Sweden's Tetra Pak organization devised the

deceptively simple tetrahedron package (like a three-sided pyramid...the base comprising the fourth—or "tetra"—plane) that was created from a roll of paper and plastic laminate formed into a vertical tube and heat-sealed through the liquid contents.

The new one-way packages were cheap to make, easy to distribute, and quite clean. They still required refrigeration, however, and ultraviolet light could still penetrate. Hot filling and autoclaving were out; the seals would never stand the heat and, if truth were admitted, neither would the milk...at least not in a state the most consumers were prepared to accept.

The breakthrough was to come in the late 'sixties when an inner filling of aluminium foil was added to the laminate "sandwich" thus inhibiting the entry of oxygen, blocking out light rays, and permitting the use of electrical-induction sealing, allowing packages to be sealed literally from the inside out. At the same time, the packages were sterilized by a combination of heat and hydrogen peroxide so that milk that had been previously sterilized could be packaged at ambient temperature.

Today's easy-to-stack modular brick-shaped derivative, the Tetra Brik carton, is now produced in India from a high percentage of Indian raw materials. A component of Operation Flood, this type of packaging has helped India's bold, far-reaching

efforts to achieve self-sufficiency in her dairy industry.

When milk is sterilized after pasteurization, by raising the temperature under pressure for as little as three or four seconds to 140°C, and then cooled rapidly, flavour and nutrients are well protected. If this "ultra-high-temperature" (UHT)-treated milk is placed in aseptic packages and the filling zone is kept clean by an overpressure of sterile air, the resulting product will last for months without refrigeration.

When applied to milk, the UHT process minimally affects vitamins A, D, E and K. While regular pasteurization (with its longer cooling cycle) destroys some of the B vitamins, the UHT process leaves a large portion of them unharmed. Because most Tetra Pak aseptic packages are opaque, they also protect milk from the ravages of ultraviolet light, which is known to destroy riboflavin and vitamin C.

The Tetra Brik aseptic carton, like all Tetra Pak aseptic packages, is formed from a paper-based laminate. Micro-thin aluminium foil is bonded with polyethylene to the inside surface of the paper. The resulting "sandwich" is coated inside and out with more polyethylene; the only substance that contacts the product is plastic. Although it uses marginally more material than the tetrahedron, the Tetra Brik format saves considerable space in storage and distribution.

The Tetra Pak system of sealing packages through the contents eliminates headspace oxygen that inevitably reduces the shelf-life of the product.

Laminated cartons burn easily. They also save fuel in transportation: two full milk bottles weigh about the same as three full Tetra Brik cartons. In addition, they circumvent the vexing problem of collection and return and cleaning of the bottles... and the danger, too, posed by broken glass.

The recent acquisition by India's National Dairy Development Board of Tetra Brik aseptic AB10 packaging machines, conveyors, tray packers and related equipment complements the 16 half-litre aseptic tetrahedron machines that are now packaging cow and buffalo milk.

The 200 ml Tetra Brik packages will pack 200 ml portion packs at several dairy locations in the country. The one litre Tetra Brik will pack one litre cartons of milk in several upcoming aseptic packaging stations.

Dairy-sector packaging material is being provided from the Hindustan Packaging Company (HPC) factory at Itola. HPC is owned jointly by the Indian Dairy Corporation and Tetra Pak. Technical assistance from Tetra Pak in Singapore complements the efforts of newly-trained Indian service technicians.

Tetra Brik milk packaging machines will help provide nation-wide distribution of long-life milk through small stores. This change from morning bulk delivery at market stalls will permit milk to be more widely and frequently available without heavy investment in refrigerated transportation and storage.

The fact that only 125 million of India's 780 million citizens live in large urban centres makes long-life milk in one-way packages particularly advantageous. Ruben Rausing, Tetra Pak's Swedish founder, defined a good package as one that saved more than its cost, including refrigeration, transportation, storage, handling, labour. Indians and the citizens of nearly one hundred other countries seem to agree: last year, there were more than 37 billion Tetra Pak packages formed, filled and sealed throughout the world.

Authorities in some countries have also recognised the value of a milk package as a message carrier and have ordered their rolls of packages with as many as two dozen different texts (often related to public health) in any one print run. Many jurisdictions recognise the energy value locked up in the carton and prize Tetra Pak packages as fuel for incinerators that generate steam or electricity from waste. ■

A WINDOW TO INDIA'S DAIRY WORLD!

Know who's doing what and where. All about know-how and know-why. A handy update on market data: who buy's what? who sells what? where? Trends in demand and supply?

The emergence of advanced packaging techniques has made possible the commercial availability of milk and milk products in handy convenient packs, rendering them safe, hygienic, wholesome while retaining freshness and flavour.

Packaging of Dairy Products

A.A. JOSHI

Deputy Director, Indian Institute of Packaging, Bombay

WITH a substantial increase in India's milk production, which according to one estimate is likely to approach 45 million tonnes in 1986-87, the availability of milk and dairy products is rapidly increasing. Most of this increased milk production has been in the rural pockets of the country, while the major markets for dairy products are in the cities. So, the need for its transportation over long distances has become a necessity. Milk, being a highly perishable product, utmost care is needed in its preservation during storage, handling and transportation. This is also true of dairy products like butter, ghee, yoghurt, dairy sweets, etc.)

(Milk spoils fast at high ambient temperature in the presence of oxygen and other contaminating agents present in the atmosphere. Similarly, other dairy products also have a relatively short shelf-life, and major factors responsible for their spoilage are temperature, oxygen and bacteriological activity. Hence, primary requirements of preservation of most of the dairy products are to store it under as cool a temperature as possible, hygienically handle it and protect it from oxygen and bacterial contamination.)

(Organized milk marketing in India made its beginning in 1950 with bottling of milk in Bombay, followed by Calcutta and other cities.) Glass bottle is a multi-trip package for milk, and on an average each bottle performs as many as 91 trips to the consumer

before it goes out of circulation. Bottles are filled on automatic filling machines at a speed of 90 bottles per minute approximately and sealed with aluminium foil. Use of multi-trip glass bottles makes prior cleaning of bottles before filling necessary. Weight of empty glass bottle is also high, resulting in higher freight cost. It is estimated that cost of bottling milk in glass bottles is around 12 paise per litre.

(Today, though bottling of milk is still prevalent in many dairies, it is fast being replaced by plastic pouches. This was a new concept in that unlike multi-trip reusable bottles, plastic bags were single trip containers.) Economics worked in favour of these pouches as it saved need for returning the empty containers to the dairies and its subsequent washing and cleaning before refilling for the next trip. In Bombay, the Aarey Dairy was the first in the country to experiment with plastic pouches more than a decade ago. Today, even in smaller cities, milk pouches have become very common due to the convenience it offers. (A good consumer response to milk pouches paved the way for the technological changes needed in the industry. Initially, the form-fill-and-seal (FFS) machines used for packaging of milk in pouches were imported but these machines are now manufactured indigenously by a number of units in the country. Availability of plastic films needed for the pouches also increased during this period,) with the number of entrepreneurs taking up the production of multi-layer films multiplying.

Form-Fill-and-Seal (FFS) System: In this technique, raw materials i.e. milk and plastic film (commonly LDPE) are fed into the form-fill-and-seal (FFS) machine. First, the plastic film is formed into a tube, sealed along its length and then at bottom, thus forming a pouch. It is filled with the milk and then sealed at the top. All these steps constitute a single continuous operation in the same machine. Thus, milk is handled more hygienically. The use of ultra-violet light inside the filling cabinet of the machine minimises bacterial contamination. The machine runs at a speed of about 40-60 pouches a minute. The cost of a one-litre pouch ranges between 16-18 paise. For sweetened milk, multi-layer LD/LD film is also used with outer film being opaque and inner one in black colour, which helps in reducing transmission of light inside the pouch. Of late, co-extruded multi-layer LDPE/LDPE film is becoming more popular, as it helps in material saving due to its better barrier properties. Generally, 65 micron thick film is used, as against 75 micron of monolayer film. The cost of FFS machines ranges from Rs 75,000 to Rs 4,50,000.

It is estimated that for a new dairy which needs to distribute 1.5 lakh litre/day of liquid milk, it is more economical (70 per cent in capital investment) to set up LDPE pouch filling system than glass bottle filling equipment. Also, in terms of operational cost, LDPE pouches are economical. A one-litre pouch costs approximately 14 paise. In 1984-85, 12,000 tonnes of LDPE milk pouch film were used for packaging 6.5 million litres of liquid milk per day.

Tetra Pak: A new entrant in the Indian dairy market, this system has converted a highly perishable product like milk into a grocery item. The Tetra Paks are now available even with a grocery store. In this package, milk remains good for more than ten days without its storage in a refrigerator. This has become possible because of ultra-high-temperature (UHT) treatment of milk prior to packaging and then aseptically packing it in a pre-sterilised package. The milk packed in these packs is not pasteurised, but it is sterilized at 140°C for 2-3 seconds. The packaging material is also sterilised with hydrogen peroxide. The sterile material is first formed into a tube shape, filled with milk and sealed in tetrahedron/brick shape, all done in aseptic conditions.

The machinery needed for this system is more capital intensive. The package used is LDPE-coated paperboard made locally. The present pack uses 170 gms paperboard laminated with 10 micron/LDPE from outside and 70-75 micron LDPE from inside. The cost of 500 ml. Tetra Pak is around 40 paise. Though this is higher than the bottle and plastic pouch system, consumers particularly in cities find it more convenient since they can buy their milk requirement once in a week or use it as an emergency stock due to its extended shelf-life.

Tetra Brik packs have also appeared in the Indian market recently, although it was first introduced for retailing fruit juices. This is a brick-shaped carton of one- or half-litre capacity, with other components remaining the same as Tetra Pak. It uses aluminium foil of 7-9 microns in addition. This will help in enhancing its shelf-life upto one month without, of course, refrigeration. It may cost around 80 paise/litre.

Bulk Vending Booth: Some dairies are trying a system where milk is stored in FRP (fibre reinforced plastic) tanks with automatic dispensing device. This system is likely to catch on very fast as it reduces milk distribution cost. To facilitate wide distribution and to reach different economic groups, milk was sold through 412 towns in such modes of supply as bulk vending, FRP tanks, cans/sachets and Tetra Pak. In 1985-86, the Delhi dairies alone distributed on average close to 9 lakh litres of milk per day through 300 bulk-vending booths, 340 insulated containers, 245 polypack milk retail outlets and two unrefrigerated mini booths.

Packaging of Shrikhand: With the increased availability of milk, need for marketing milk-related products have also grown. Though many of these products have been traditionally made in most of the Indian homes, their commercial availability became a reality only due to the emergence of better packaging techniques. Now, the Baroda Dairy has installed a machine in which High Impact Polystyrene (HIPS) sheets are heated and formed into cups or trays and then filled with shrikhand which is heat-treated in order to extend its shelf-life prior to filling. Sealing of the cup or tray with polystyrene film or aluminium foil coated with paper and wax follows immediately to give a continuous flow of nicely packed and sealed cups of shrikhand. The entire process of

forming, filling and sealing is done as a single continuous operation, thus minimising the risk of contamination.

Plastic cups are moisture-proof, leak-proof and convenient to use. Weight of the HIPS cup varies from 5 gms to 35 gms and thickness between 0.3 mm and 0.65 mm. These cups have capacities between 100 ml to one litre and cost in the range of 35 paise to Rs 2.50 with two-colour printing.

Butter: It consists primarily of about 80 per cent milk fat, 15 per cent moisture and in table butter upto 3 per cent common salt. Because of high moisture content, butter is susceptible to mould growth. Mould growth is inhibited by exclusion of air while packing by tight wrapping or by avoiding head space in the container. Packaging must protect the product for preservation of its flavour, body, texture, appearance, moisture and colour. Packing of butter therefore should have resistance to fat, oxygen, moisture, foreign odour and light. In India, butter is packed in bulk as well as in retail packages. For bulk packaging there is no standard method, and stainless steel and tin plate containers are used. For retail packaging, there is some degree of standardization.

There is an Indian Standard (IS: 2034-1961) which gives specifications for tin cans of 200 gms and 400 gms capacity, used for butter. It specifies tinfoil thickness of 0.24 mm and 0.17 mm respectively, and minimum tin coating of 17 g/m², besides many other requirements. Tinfoil containers are the best for product protection, but owing to their increasing cost, very little quantity of butter is packed in the tin containers.

Flexible packaging materials like vegetable parchment paper or grease proof (GP) paper, aluminium foil, and folding board cartons which together give similar protection to the product are more commonly used. There is an Indian Standard: 7161-1973 which gives specifications for vegetable parchment paper or GP paper/aluminium foil laminate for wrapping butter. A vegetable parchment paper has a good wet strength and is always in contact with butter. Generally, paper of 45 gsm and above and aluminium foil above 0.009 mm thickness are used.

Butter being highly susceptible to foreign odour, one has to be very careful while choosing adhesive and printing inks used in

the manufacture of the laminates. There is also another IS:8113-1976 for primary cartons for packaging of 100 gms, 200 gms and 250 gms butter slabs. Cartons protect butter while handling, after packaging in primary wrapper, in the distribution system. Since butter is stored in the refrigerator, cartons may be waxed with about 10 gsm wax on each side, though it is not mandatory. As most plastics have poor fat resistance, plastic films are not recommended for long-term storage. However, for short-term storage and packaging, many vendors of butter use LDPE or HDPE film, along with a paper overwrap.

Ghee: It is usually 100 per cent fat, obtained by boiling butter at 110°C till all water is evaporated. For long-term storage, stainless steel containers or tinfoil cans are desirable. Multi-layer co-extruded films LDPE/HDPE are being increasingly used for short-term storage. Nylon/Syrllyn-based laminates are also being experimented. Generally, plastic pouches are filled on automatic FFS machines. However, if the sealing surface is contaminated with the product, sealing of the pouch becomes difficult. Packaging material should have good fat resistance and barrier properties against oxygen and moisture. IS: 11352-1985 specifications for flexible packs for the packing of edible oils and vanaspati have been developed for this purpose.

Cheese is essentially a product with high fat and moisture content. Therefore, package used for cheese should prevent moisture loss, ingress of oxygen to prevent oxidation and mould growth. It should also have fat and grease resistance and be able to protect against micro-organisms. Oxygen is eliminated by packing cheese in hermetically-sealed containers in vacuum or in inert gas atmosphere. Processed cheese is usually packed in aluminium foil in cubes with different shapes. Tinfoil cans are used for 200 gms and above quantity. PVDC coated plastic films are suitable for cheese packaging as they provide good oxygen and moisture barrier properties.

Dried Milk Powders: Since whole milk and infant milk powders are rich in fat (20-30 per cent). Packaging material should provide protection against oxygen and moisture. Generally tinfoil cans are used, and packaging is done under nitrogen cover to replace air by nitrogen in the headspace of the tin cans. Skim milk powders have very low fat content and as such a good moisture barrier

material is adequate for short-term storage. Multi-wall paper sacks with one polyethylene liner (IS: 1165-1975) is used for bulk packaging. Lined cartons are used for re-tail packaging. The multiwall bags can be tested for their transport-worthiness according to IS: 7028. Recently, some skim milk powder has also been sold in polyethylene bags of 1 kg. Even plastic bottles of HDPE are being tried for 200 gms and 400 gms of powder.

Ice Cream is made by mixing milk, cream, sugar, stabilisers and flavours. Since ice cream is stored at very low temperatures, packaging material used for ice cream should have low temperature stability. It should also provide protection against contamination, ease of opening, ease of disposal, and it should also be amenable to attractive printing. Waxed-coated paper board is commonly used in the form of cups and cartons. IS: 7162-1973 gives specifications for waxed cartons for packaging of 300, 500 and 1000 ml of ice cream. The standard also covers packing of 100 ml chocobars. Generally, paperboard made from virgin chemical wood pulp, coated with wax, is used. Bars are generally wrapped in

vegetable parchment paper. High impact polystyrene (HIPS) cups are also becoming popular.

The empty plastic cup does not support the growth of bacteria which is rampant in the case of paper packaging. Further, their comparative strength and rigidity lend themselves to use in automatic filling equipment, especially true of small packs of 50 and 100 ml, required in large numbers. The rigid dimensions of thermo-formed cups lend themselves to high-speed filling. From the market point of view, it also makes it possible to get white, translucent or even transparent cups with lids or sealable closures. In terms of cost effectiveness, small sizes of plastic cups are approximately 20 per cent costlier than paper cups. However, taking into account, the obvious advantages of thermoformed containers, with hygiene, extended shelf-life and attractive package, the modern plastic packaging will get increasingly popular.

Packaging of indigenous products:

Pedas are first wrapped in grease proof paper and then placed in cartons lined with

(Continued on page 69)



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The innovation of environmentally-controlled fodder production unit can help overcome the shortage of green fodder for livestock. The functioning of the system alongwith its advantages are presented.

Fodder Production Units

JOHN R. BRADY

President & Managing Director, Fometa Overseas, S.A.

INDIA and the world today are facing serious deficiencies in food production caused mainly by the annual increase of population and decrease of available arable agricultural lands. The problem is aggravated by the low-production traditional system of land management and livestock production coupled with inadequate availability of proper livestock feed in many countries. This, in turn, also causes a serious shortage of dairy products and other animal protein food supplies. There is now an increasing realization that a lasting solution to this food deficiency problem lies in the application of improved techniques and the acceptance of new technological systems which can assist known conventional agricultural methods.

The future of livestock industry is becoming more and more dependent on such new technological developments. Environmental constraints, diminishing arable lands, energy crisis and population explosion are some of the prime factors that seriously necessitate consideration of alternative systems of livestock management, particularly relating to feed production. Fresh green succulent fodder has always been recognised as the basic feed for livestock. However, the production of green fodder is declining owing to constraints imposed by climate and land availability.

To meet this situation, one recent technological innovation is the development of environmentally-controlled fodder production unit (FPU). Providing optimum plant

growth conditions and utilizing soilless technique, the FPU can produce one tonne (1,000 kgs) of clean, fresh green fodder every day of the year, regardless of weather conditions. The unit consists of a hermetically-sealed chamber with 672 growing trays. Each day for eight days seed is planted in 84 of these trays. On day eight, the first set of 84 trays is harvested, yielding 1,000 kg of fresh green fodder. From then on there is a continuous cycle in which 84 trays are harvested and replanted every day. The daily production and nutritional value of the green fodder remain consistent throughout the year. The daily output of fodder can be stepped up proportionately by increasing the number of FPUs, using the modular principle. The FPU and its related system has been developed over a 14-year period and successfully tested and operating in a number of countries.

FUNCTIONS

The functions within the chamber commence with the filling of the water sump tank. A soluble nutrient containing the basic ingredients of a fertilizer is added to the water. Every six hours, the irrigation system automatically sprays the nutrient-laden water in mist form on the seed-filled growing trays for only two minutes. The total water consumed each day for the production of one tonne of fodder is approximately 300 litres with the excess water flowing back into the system. Special waterproof type of lighting is used on a

reflective candle light basis to effect the photosynthesis of plant growth.

Two environmental control units in the chamber maintain a constant temperature of 18° to 20°C along with maintaining humidity control, aeration and proper balance of gas exchange for optimum plant growth. Employing soilless technique, 145 kgs of any type of cereal grain seeds such as barley, rye or oats are planted daily in 84 growing trays which produce daily one tonne of fresh green fodder.

From seed to feed in eight days: During the first three days, the seed germinates and forms its own root structure without any medium, from which the green matter fully matures during the remaining five-day period.

NUTRITIVE VALUE OF FPU FODDER

The quality of fodder from the FPU is superior to other green forage available because:

- It is grown from clean cereal grain seeds (barleys, rye, oats, etc.) of the highest nutritive value;
- The nutrient formula, used to irrigate these seeds, enhances their nutritive value by correcting any deficiency in the micro-elements composition of the fodder, exactly as adding fertiliser to the soil;
- Being grown without soil or any medium, the seeds, during the first four days of their eight-day growth cycle, develop a three-inch thick root structure, inclusive of their sprouted seed bulbs. This root structure, full of protein and carbohydrates, is wholly consumed by animals, whereas in the traditional pasture cultivation, the seed bulbs and root remain unconsumed as they are underground;
- Its green and juicy legume, ten-inch high, is constantly and consistently at a juicy "spring grass-like" stage of growth all through the year, providing maximum digestibility and metabolisable energy to the animals; and,
- Combined with other dry feed elements in the daily ration, the catalytic properties of fresh green cereal grass stimulates the digestive functions of enzymes either in the rumen, reticulum or intestine. The stimulus in turn increases the digestibility and metabolizable energy of the other dry feeds and therefore of the total ration.

EVALUATION OF THE FPU SYSTEM

The FPU system was first introduced in India in late 1983 by Fometa and tested under local conditions for nearly three years. These tests were carried out under the supervision of State Government veterinary officers and animal nutritionists. The results proved that the fresh green fodder produced from the FPU system decreased the overall intake of feed ration and other related costs over the full lactation period of the milch cows and increased the milk yield from 30 to more than 50 per cent. Based on the existing prices in India, the FPU system of fodder production was found to be 40-50 per cent cheaper than any feed of equivalent nutritional value.

The effect of feeding FPU-produced fresh green fodder to Indian livestock was studied in a test conducted at the Experimental Dairy Farm of the Development Corporation of Konkan Limited at Aarey Milk Colony, Bombay. The test points out that "a better than average general health condition was monitored among all the animals which were fed fresh green fodder, resulting in much lower veterinary expenditure compared to usual standards during this hot period of the year."

The test results further state that fresh green fodder effectively procures a substantial increase in milk yield, while allowing for a reduction in the use of expensive concentrates thereby reducing the overall cost of milk production besides contributing to the animals better health conditions.

"This can be explained by the analysis of the fodder which shows high energy content, high protein, low fibre and high digestibility—all factors which make it into a high nutrition concentrated fresh green fodder for cattle and other livestock," the results concluded.

FPU TECHNOLOGY IN INDIA

The introduction of the FPU technology in India calls for a three-phase programme. In the first phase, the fodder production units will be utilized in establishing model FPU demonstration-cum-training centres at selected locations in different parts of the country for making available the benefits of the new technology. Phase two will mark the commencement of manufacturing the fodder

(Continued on page 63)



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Cattle insurance is an important input for encouraging the farmers to invest in high quality animals for augmenting milk production.

Insurance Coverage for Cattle

ASHOK GOENKA

Chairman, General Insurance Corporation of India

INDIA is the seventh largest and second most populous country in the world. Over 80 per cent of our population lives in villages. A number of schemes and projects has been taken up for socio-economic development of rural areas. Many of these have been merged into what is called Integrated Rural Development Programme. Development of livestock and animal husbandry occupies a prominent place in this programme.

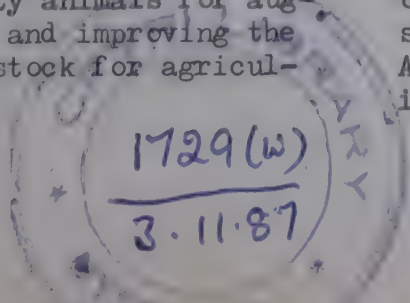
According to the livestock census of 1982, the cattle population of the country was around 260 million. This roughly accounts for about 15 per cent of the world cattle population. Buffalo population in India is the highest in the world. There is almost one buffalo per 11 human heads. Sheep and goat population in India is also quite large. Production of milk from the cattle has been an important occupation of the farmers in our land since time immemorial. Livestock development programme, therefore, lays emphasis on selection and improvement of the breed and proper health care of the animal, in addition to availability of credit for purchase of cattle.

The National Commission on Agriculture recognised livestock insurance as an important input for encouraging the farmers to invest in high quality animals for augmenting milk production and improving the work potential of male stock for agricultural purposes.

With the setting up of the National Dairy Development Board, dairy industry in India has made rapid strides. It has been recognised that cattle play a vital role in improving the economy of the farmers and they need to be insured against the hazards of health and death. Insurance of financed cattle not only protects the interest of the financing institutions but also protects the farmer from distress caused by death of the animal during its productive life span.

Attempts to introduce cattle insurance were made by a few private insurance companies even prior to nationalisation of the business, but these were on a very limited scale. Not much headway could be made due to lack of infrastructure imperfect system for identification of insured animals and inadequate animal husbandry and veterinary services.

After nationalisation of general insurance, the GIC and the four operative companies, viz, National Insurance Co Ltd, New India Assurance Co Ltd, Oriental Insurance Co Ltd and United India Insurance Co Ltd gave serious attention to the need for the expansion of cattle insurance as one of the steps for the benefit of the common man. Dialogues were held with Reserve Bank of India and financial institutions to persuade them to insure the financed animals. A Master Policy has since been introduced in consultation with banks for automatic



coverage of all financed animals, right from the time of purchase. For cattle subsidised under IRDP, SFDA, MFAL and DPAP projects, a special low cost insurance cover at a premium rate of 2.25 per cent has been introduced.

Group Cattle Insurance Schemes at a premium rate of 2.85 per cent were also introduced for 'Amul' and 'Mehsana' Dairies in Gujarat and for District Co-operative Milk Producers' Unions in Rajasthan. Similar Group Schemes have been negotiated with dairy authorities in Andhra Pradesh, Tamil Nadu and Sikkim. Insurance covers have also been devised for bullocks and he-buffaloes, cross-bred heifers and calves, sheep and goats, and other types of work animals, like camel, ponies, horses, mares, mules, donkeys, etc. Covers are also available for piggery, poultry, ducks, etc.

To have continuity of insurance, a long-term cover spread over three to five years with a premium discount of 25 per cent has been devised.

Premium subsidy is proposed to be provided by the Ministry of Agriculture for insurance of elite animals registered under the Central Herd Registration Scheme.

In order to provide effective rural thrust for the development of cattle insurance business, the insurance companies have spread their branch network very substantially. Exclusive cattle branches have also been opened where a reasonable volume of cattle insurance business is available.

To popularise cattle insurance among the rural community, the Companies organise meetings in rural areas, issue leaflets and other literature in regional languages, participate in melas, agricultural exhibitions, cattle fairs and livestock shows; radio talks and puppet shows are also organised. Films on cattle insurance have been produced in regional languages so that a large number of rural people could become aware of its benefits.

Training programmes are organised for veterinarians as also for non-veterinarians, and arrangements have been made with financial institutions to include a talk on rural insurance in their training programmes.

The number of cattle heads covered by insurance has increased from a mere 30,000 in 1974 to 161 lakhs in 1985, i.e. 32 per cent of the insurable cattle population of

about 500 lakhs in the country. With a fairly large base thus established, efforts are now being made to extend cattle insurance to individually owned cattle where no bank finance is involved.

The question of streamlining procedures, rates and policy terms and conditions has been kept under continuous review, and a number of improvements have been made from time to time in consultation with the concerned agencies. Proposal-cum-policy-cum-receipt forms along with informative leaflets, posters, etc., have been brought out in various regional languages.

Many concessions have been extended to the IRDP beneficiaries regarding premium rates, amount payable at the time of claim settlement, relaxation in the upper age limit, etc.

To eliminate procedural delay, it has been agreed to accept death certificates of DRDA or its authorised nominee. This will help in providing quick replacement of the deceased animal.

In the absence of death certificate from a qualified veterinarian, death certificates issued jointly by any two named village officials are also accepted. Notice of death of the animal is now required to be given and claim papers submitted within 30 days from the date of death. Upper age limit has been increased from 8 years to 10 years in the case of milch cows and from 8 to 12 years in the case of bullocks/he-buffaloes. Giving up the conventional method of settlement of claims on the basis of sum insured or market value whichever is less, it has been agreed to settle claims on the basis of the sum insured irrespective of the market value of the animal at the time of death. The beneficiary is thus able to receive the amount required for replacement of the deceased animal. A number of contingencies like death due to surgical operations, death due to famine, and diseases contracted prior to commencement of risk, which were earlier excluded from the scope of the cover, is now included. For the benefit of the beneficiaries, a list of do's and don'ts has been prepared and circulated to State Governments for wide publicity in regional languages.

It must be appreciated that cattle insurance business is not aimed at earning profit. As our systems improve and efficiency in handling cattle insurance leaves some

margin, the benefit will be passed on to the insuring farmers. It has, therefore, to be a joint endeavour to see that bottle-necks experienced are identified and steps taken for their removal. For this purpose, the Insurance Companies as well as the various government agencies and banks have to effectively play their respective roles and make it a common cause.

Suggestions are often received from various quarters for further liberalisation of terms and conditions of the insurance policy. It must be realised that cattle insurance is meant to benefit the insuring farmer, and whatever is possible for increasing his benefits must be seriously considered and attempted. At the same time, it has to be ensured that the scheme remains viable. There must also be safeguard against dilution of the terms and conditions to an extent that unscrupulous and undeserving persons are able to run away with unintended benefits.

Complaints are often received about delay in settlement of claims. Insurance Companies are anxious to settle cattle claims as fast as possible so that the beneficiary can replace the lost animal and avoid loss of income. Otherwise the very object of insurance would get defeated. Help and cooperation of DRDAs and banks are essential. It is necessary to ensure that the formalities are completed and claim papers sent to Insurance Company expeditiously. It may be desirable to lay down suitable norms and modalities so that no cattle claim remains outstanding beyond a specified time limit.

Proper identification of the insured animal is another problem area. Ear tagging with brass metal screw tags has so far been found to be the only feasible method of identification. Cost of the ear tag and its tagging is borne by the Insurance Company. Hot branding is not favoured on the ground of cruelty to the animal, while cold branding has not been found effective. But there are other alternatives like tattooing, muzzle print etc., which could be considered. With the advancement of technology an effective and affordable system of identification needs to be devised.

The quality of technical and veterinary services should be further improved. The nation can ill-afford the loss of valuable cattle. Constant efforts have, therefore,

to be made to adopt loss prevention and loss minimisation measures. Periodical check-up of animals by veterinary surgeons, Block Development Officers and other functionaries in the rural sector, and timely vaccinations and inoculations against various kinds of diseases and epidemics are a must. Veterinary services should be provided free or at a cheap and affordable cost. Insurance Companies have employed a number of veterinary officers. They have been provided kits for treating animals during their rounds. Their services can be utilised by various agencies, wherever necessary, in the overall national interest.

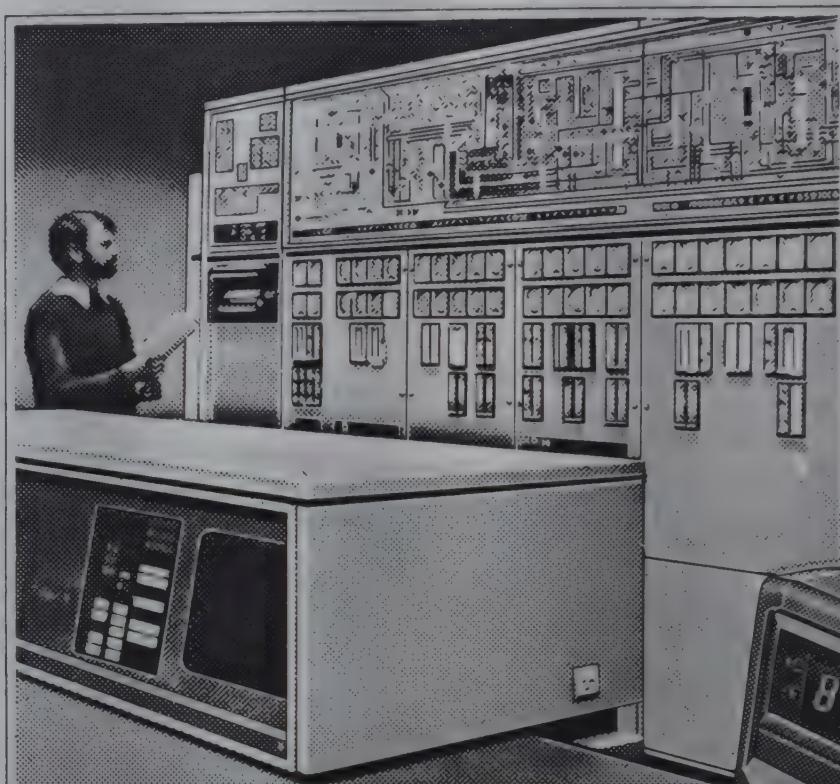
The insurance industry has been giving loans to State Governments for fire fighting equipments. Similar loans for veterinary hospitals and dispensaries in rural areas can also be considered.

So far, only financed or subsidised cattle have been tackled. Efforts now need to be directed to cover individually owned non-financed cattle. For this, it would be necessary to have proper linkages with village level agencies, apart from involvement of the Animal Husbandry Departments of the State Governments. As against the normal premium rate of 4 per cent, the Companies have been allowed to give discounts for direct insurance of privately owned cattle in groups, so as to bring down the net premium rate upto 2.55 per cent.

A large number of valuable milch animals are lost every year in floods and other natural calamities. Government spends several crores of rupees for rehabilitation of the affected persons. A comprehensive insurance cover for such catastrophies should be considered. The premium payable would be moderate. Realising the efficacy of insurance as compared to creation of mortality funds, animals in government farms are now being insured. Similar action should be taken in respect of military farms, and farms in agricultural universities. In the perspective of the Seventh Plan, it is necessary to take stock of the situation and evolve appropriate strategies for the future.



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Biotechnology has tremendous potential to make inroads into dairy industry with its newly discovered might.

Biotechnology and Dairy Industry

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BIOTECHNOLOGY, in a prehistoric sense, dawned upon earth when man brewed his first alcoholic beverage, and preserved excess milk by making curd and cheese. Most recorded evidences, both archaeological and historical, indicate that these practices were well established around 2000 BC. However, classical scientific biotechnology started only in the beginning of the 18th century AD, when wine making, brewing and cheese making became industrialized.

Today, biotechnology is on the threshold of a renaissance. Spectacular developments in biology, engineering and microelectronics have revolutionized the concept of biotechnology as it envisages a fruitful union of these sciences for increasing human resources. Some novel techniques developed during the marvellous scientific endeavour of the past fifteen years have given it a renewed vigour and efficiency. These are the techniques of genetic engineering or recombinant deoxyribonucleic acid (rDNA) technology, enzyme engineering (immobilized enzyme technology), protoplast fusion and tissue culture (plant biotechnology), immunobiology (monoclonal antibodies or hybridoma technology), advance fermentation technology and engineering and computer-aided controls. These very powerful techniques have given unprecedented scope and precision to modify animals, plants, and microbes for increasing their usefulness. Great advances are therefore promised in the areas of health care, agriculture, and manufacture of foods and chemicals.

How far the dairy industry can benefit from the biotechnology boom? Biotechnology has tremendous potential to make inroads into dairy industry with its newly discovered might.

GENETIC ENGINEERING

Genetic engineering is the most powerful of all the techniques fundamental to biotechnology. This technique has the potential to modify any biological trait. It became a reality with the discovery of restriction endonucleases, the enzymes that cleave DNA at or near specific recognition sites. The genome of a cell carrying gene(s) of interest (foreign DNA) is digested with a specific endonuclease. A small molecule of vector DNA capable of penetrating bacterial cells, a plasmid, phage or a tailored segment of either of the two or both (cosmid) is also digested with the endonuclease. The two digests are then mixed. A DNA joining enzyme, called ligase, is then added to the mix which joins the segments of foreign DNA with the vector in various permutations and combinations. This modified vector DNA is then allowed to transform a large population of an easy to grow bacterium like Escherichia coli. The transformed population of bacterium is then screened for the cells containing the desired gene. The colonies of such cells are identified, picked up, and propagated for the recovery of desired gene product.

Dairy enzymes: Biotechnology is gearing up

in a big way to satisfy a 300-million dollar world trade in enzymes, approximately 160 million dollar worth of them are consumed by food and detergent industry. Dairy industry accounts for about half of that consumption. The enzymes, chymosin (rennin or rennet), proteases, lipases, galactosidases (lactases) and catalases, are of significant interest to dairy industry. These enzymes are presently procured from scarce animal or plant sources. From vegetarian's point of view, animal sources are unethical and involve cruelty to the animals. Microbial sources, sometimes, give enzymes of unsatisfactory quality with undesirable side effects. Often the yields are also poor. This escalates the cost of the product.

Among various milk and milk products, the world demand for cheese is registering a consistent growth. Rennet requirements of expanding world cheese industry (total production about 9,000,000 tonnes per year) are also steadily increasing. Its limited source, the abomasum of unweaned calf is in short supply, which has led to the cost inflation. India, with a very small cheese market, needs to import about 350 kilograms of rennet for the production of about 1,000 tonnes of cheese for home consumption. Biotechnology with its rDNA and enzyme immobilization techniques have taken up the challenge to satisfy a market worth 65 million dollars a year. In fact, rennin producing genes from calf have already been cloned in Escherichia coli by Japanese workers and more recently in E. coli and yeast saccharomyces cerevisiae by Dairyland Food Laboratories of USA. However 'nuts and bolts' of the technology i.e. scaling up operations, remain to be accomplished. Demand for other enzymes of importance to dairying is also increasing. In not too distant a future, it will be possible to have engineered microbes producing desired dairy enzymes in a large scale fermentation process. This would mean a steady supply at low costs. Biotechnology firms are actively engaged in producing enzymes and their blends for enhancing the processing, ripening and aging of cheeses.

Engineered starter cultures: Starters are selected strains of microorganisms intentionally added to milk or cream or a mixture of both during conversion into milk products for bringing about specific changes in the appearance, body, texture,

flavour and taste of the desired final product. Due to certain extrinsic or intrinsic factors, starter cultures often fail, resulting in losses in terms of raw material, time, manpower and product quality. The rDNA technology promises the dairyman ideal starters.

The use of antibiotics is widespread in the treatment of mastitis and other cattle diseases. This leads to milk with residual antibiotics. The production of fermented milk products with such milk is a real problem. Milk with penicillin 0-02 IU per ml can inhibit Streptococcus thermophilus and can give slow yogurt. Penicillin in 0.60 IU per ml concentration can inhibit almost all dairy starters. Probably, the only way out is to engineer starter cultures for antibiotic resistance.

Bacteriophages or phages are viruses of bacteria and may be present in the dairy environment. Starter cultures can get infected by phages generally resulting in lyses of bacterial cells. Such an infection is easy to identify when single strains are used, and more difficult with the multiple strain starters. In the making of fermented dairy products, especially cheese, phage infection has a devastating effect on the whole process.

Although no major breakthrough has yet been achieved, fundamental knowledge of molecular biology of dairy starters is accumulating. It is possible with the help of rDNA technology to evolve starters which are resistant to phage infection. It could be done by introducing lysogeny, receptor site mutations and restriction modifications of the starter genome. In fact, restriction modification of Streptococcus lactis has been carried out to make it phage resistant. A lot of efforts are under way to develop phage resistant starters. Genetic engineering of starters also needs to be carried out with respect to lipolytic activity; caseolytic activity; production of useful antibiotics such as nisin, acidophilin, bulgarican, lactolin, lactobrevin and bacteriocin; vitamins and amino acid production; synthesis of dairy aroma compounds such as acetaldehyde, acetoin and diacetyl; lactose fermenting ability in certain yeasts and resistance to low chain fatty acids. Further it would be interesting to have starters with genes cloned for degradation of cholesterol and toxic

compounds in milk such as aflatoxins, pesticide and insecticide residues. With all this, it is important that all strains of starter bacteria have a very low frequency of spontaneous mutation.

Cattle health and productivity: Most attention under this category has been paid to drugs and vaccines. Vaccines essentially consist of attenuated viruses too weak to be virulent, but active enough to evoke a full immune response in the recipients against natural infection. However, traditional vaccine can lead to side effects or even disease against which it is required to protect. Furthermore, viruses for vaccines are cultured in animals and in the process may get contaminated with other viruses or may mutate themselves. Some viruses (oncoviruses) are also suspected of causing cancer. rDNA technology can help overcome these problems. The genes responsible for virulence, side effects and other undesirable traits can be deleted from the viruses retaining only antigenic determinants. Such tailor made viruses can give safe vaccines. Considerable advance has been made in the development of engineered foot-and-mouth vaccine for preventing this highly prevalent disease in cattle.

Improvement in livestock would also include increased feed efficiency, growth rate, fertility, milk output, milk quality such as high protein low fat, increased polyunsaturated fatty acid, and disease resistance. It is very difficult and time consuming to breed the stocks for these traits. Application of rDNA to achieve these goals needs a lot of work in terms of characterization and location of genes of the trait and is not expected to be possible in very near future. However, application of embryo implantation might revolutionize the dairy breeding programmes. The technique has great potential in quick sire evaluation and in extending productive capacity of proven sires.

Forage crops also need improvement with respect to fertilizer and photosynthetic efficiency, tolerance to saline soils, better nutritional quality and elimination of nutritional stress factors such as reduction in cotton seed meal gossypol, a polyphenol resulting in low feed uptake and reduction of toxalbumin in castor beans that causes respiratory paralysis. Again, it would not be possible to apply rDNA

methods to achieve these ends in the near future.

Single cell protein (SCP) and fungal proteins or mycoproteins are destined to play a major role in animal nutrition. However, high nucleic acid content in SCP can lead to gout in animals. It is, therefore, important to reduce nucleic acid content of SCP. rDNA technology can be used for modification of the organisms for reducing their nucleic acid content. It would necessitate introduction of genes coding for DNases and RNases (enzymes that degrade deoxyribonucleic acid and ribonucleic acid) that would express themselves towards the end of yeast growth prior to harvest. SCP strains could further be improved for their nutritional characteristics with respect to vitamins and amino acids. One of the raw materials for SCP production is whey, a major dairy waste. Introduction of lactose catabolism genes into SCP system could thus be very useful for production of SCP from whey directly. Similarly, SCP organisms could be cloned for utilization of other wastes including paraffin, methanol and lignocellulosic materials. Though nutritionally and toxicologically safe, the single cell protein production is just 5 million tonnes per year, which is less than 0.15 per cent of the total agricultural output. Currently, the only country going in a very big way for the production of single cell protein is the USSR.

Dairy additives: Sweeteners, flavourants, pigments and stabilizers are other chemicals of interest to dairy industry. Genes from different organisms producing them can be introduced into suitable bacteria and the gene products recovered by a fermentative process. This will give a source of reliable supply at reduced costs. In an interesting case, rDNA has helped in solving a dual problem. Xanthan gum is commonly used polysaccharide produced by Xanthomonas campestris. The genes for lactose metabolism absent in this organism were cloned in it. The organism can grow on whey and produce stabilizer for the industry at a low cost.

Higher plants are valuable sources for food colours, flavours and fragrances, accounting for a world market worth 1-5 billion dollars. Although plant tissue culture techniques exist for the past four decades, it is only in the last five years,

fermentative type processes have been conceived for plant derived products. In plants where gene cloning is complicated, it is more practical to combine the entire genome of the two organisms by fusing their protoplasts i.e. cells stripped of their walls. Improvement of plant cells by protoplast fusion along with whole cell immobilization would further strengthen this technology.

ENZYME ENGINEERING

Enzyme mediated conversions are the hub of biotechnology. The enzyme based technology requires low energy and is therefore cost effective. However, the major deterrent in the use of enzymes is their prohibitive cost. The cost of enzymes can be reduced considerably by enzyme immobilization or whole cell immobilization techniques, stability enhancement and of course development of better sources of enzymes by strain improvement and rDNA methods. Immobilization of enzyme involves binding of soluble enzyme to insoluble organic or inorganic (e.g. porous glass) matrix. Of the organic carriers, sepharose and large pore cross linked dextrans come close to meeting all the requirements of an ideal enzyme carrier i.e. minimal solubility, high mechanical strength, suitable particle size and shape, high binding capacity for the enzyme but no adsorption of substrate and products and resistance to attack by microbes. However, they swell and shrink depending upon pH and other environmental conditions. Since 1969, silanized porous glass, which has neither of these disadvantages has been used increasingly for adsorption and covalent attachment of enzymes. The technology for immobilized rennet and lactase is already exploited commercially.

Immobilized lactase system: Lactases or galactosidases are the enzymes that can hydrolyse lactose into glucose and galactose. Their applications include reduction or elimination of lactose in milk and conversion of whey lactose into fermentable sugars. Infants lacking lactase enzyme become lactose intolerant creating nutritional problems. Many microbes also lack the ability to ferment this sugar. Lactases are mainly obtained from microbial sources. A typical immobilized lactase system consists of a reactor, which is a plate and frame unit containing replaceable modules, each made up of microporous sheets of PVC and silica. Lactase is covalently bonded

to controlled pore silica beads using silane glutaraldehyde technique.

Whey has a very high chemical oxygen demand (COD) of 65,000 mg/l. It has 5 per cent lactose and about 0.5 per cent protein. The permissible COD level for disposal is 10 mg/l. Recovery of lactose from whey is uneconomical as lactose is not industrially acceptable sugar because it lacks solubility, sweetness and fermentability by ordinary yeast. This problem dairy waste can be turned into an asset using immobilized lactase, which can hydrolyse large amount of whey lactose into glucose and galactose. These sugars can be fermented to produce fuel gas, alcohol and bakers yeast. Glucose and galactose could be recovered to be used as sweeteners in the dairy. Similarly, whey proteins could be concentrated for fortifying milk or milk products. In fact, a modern cheese plant turning out about 100 cubic metres of whey per day can be completely fuelled and powered with its whey alone. Several immobilized systems are available for the production of lactose hydrolysed milk both for home and industrial consumption. Milk treatment with lactase promotes rapid acid development by starter bacteria.

Similarly immobilized rennet systems are also entering commercial market. This would reduce enzyme expenses of the cheese industry.

MONOCLONAL ANTIBODIES

The immune system of the body comprises white blood cells or lymphocytes that originate in bone marrow. Those lymphocytes which pass through thymus are called T lymphocytes and those not passing through thymus are called B lymphocytes. The T cells are known to attack and engulf invading organism, whereas, B cells identify the chemical make up of the invader (antigens) and produce certain highly specific proteins (antibodies) which are able to recognize and bind tightly to the many antigenic determinants on the invader, that induce their synthesis. Each specific antibody is synthesized by a particular clone of B lymphocytes. It is possible to identify and isolate B lymphocytes producing a specific antibody but there was no way to propagate such a clone. The problem was overcome by Milstein in Cambridge in 1975. He fused B lymphocytes from spleen with malignant myeloma tumor cells. The

resulting hybridoma (hybrid myeloma) cells are like B cells in that each produces a specific antibody and are like myeloma cells in that they can be grown indefinitely in culture. A single hybridoma cell can thus be grown into a clone of identical cells, which serve as a continuous source of monoclonal antibody against a specific antigen. A conventional antiserum contains a mixture of antibodies, whereas it is now possible to have a single antibody against a very specific antigenic determinant from a propagated clone. In dairying, monoclonal antibodies have a significant role to play in animal health care and quality control of milk and milk products. Monoclonal antibodies can be used as magic bullets in the treatment of diseases. This is done by binding the desired drug to a monoclonal antibody developed against an infectious agent or tumor. The drug, also called immunotoxin, will then specifically act on the agent of disease and destroy it. The area of immunization against disease has also received impetus with the development of monoclonal antibodies. Animals can now be immunized by giving specific antibodies against the infection, passive immunization, as opposed to active immunization with an antigen which has the inherent disadvantages described earlier. Monoclonal antibodies have a great impact on diagnostic techniques. Using monoclonal antibodies the potential of radioimmuno assay and enzyme linked immunosorbant assay has been greatly increased. It is now possible to estimate extremely low concentrations of biologically active compounds more precisely and accurately. When bound on a support (immobilized), monoclonals have been used for purification of certain precious biological compounds and drugs like interferon (immunopurification). Thus, this very potent tool in the hands of veterinarians will certainly prove a boon for dairy farming.

In quality control, monoclonal antibodies could be used to assay for the presence of contaminants, intoxicants and pathogens in milk and milk products. These contaminants could then be removed by immunopurification.

FERMENTATION ENGINEERING

A successful biotechnology programme culminates in a large scale production process. Large scale processing involves problems of scale up in terms of equipment and

process design for bulk handling, heat and mass transfer, mixing, sterilization, maintenance of aseptic conditions and control of microenvironmental parameters like oxygen, pH and temperature. Dairy waste is essentially a negative value raw material required to be converted to a low value or high value product. The use of cattle farm waste may require a non-aseptic operation but using whey will need aseptic and hygienic conditions. Dilute reaction media involve large reactors with consequent high capital costs, high pumping power cost and high product separation cost. Of course the biotechnology engineer will keep in mind the principle of Occam's razor, that is, "the system should be no more complicated than necessary." However, more research is needed in the area of process intensification for lowest unit cost of product.

Great strides have been made in recent years in the use of computers. The modern dairy industry using biotechnology must use computerization as a means of increasing productivity. The potential areas of use of computer aided design, processes and controls in the dairy industry are numerous. Like any good technological tool, when properly implemented, the computer can increase efficiency and productivity. It can give man more time to do what it can not.

By the turn of the century world biotechnology market is expected to be worth several billion dollars. US and Japan lead the field followed by West European nations. India seems to be making a modest beginning. Though the greatest progress has initially been made in the health care and agriculture, the largest market that of food manufacture remains to be pierced. In the food sector, the dairy industry is poised to derive a great deal of benefit from biotechnology if current research trends are any indicator. ■

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NCDC is playing a vital role in planning, promoting and financing the programme for development of dairy cooperatives.

- NCDC have provided total assistance of Rs 10.85 crores for setting up of 23 cooperative dairy units, milk procurement activities and margin money assistance to the State Dairy Federations.
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The annual turnover of veterinary pharmaceuticals went up 20 times from around Rs.50 million in 1965 to Rs.1,000 million in 1986 and a projected growth to Rs.7,500 million by 2000 A.D.

Growth of Veterinary Pharmaceuticals

Dr J.N. DWIVEDI

General Manager, Animal Health Division, Merind Limited

AGRICULTURE and animal husbandry play a vital role in the Indian economy. Mixed farming has been in practice since time immemorial, and every farmer kept a few animals to meet his family's requirements of milk and draft power. However, the stress was more on agriculture which was the mainstay of farmers. Animal husbandry practices were notably absent because the returns from animals were poor, and the milk produced was used for captive consumption.

India is a vast country, having varied agro-climatic regions. The Government of India rightly identified that to enable farmers to be self-sufficient, one alternative would be to improve animal husbandry practices. Because of the vagaries of nature, it was felt that the farmer's income should be supplemented through returns from improved animal husbandry practices. Since the First Five-Year Plan, animal husbandry improvement was emphasized, and it was recognized that indigenous cattle needed to be upgraded for generating additional income from livestock.

Animal health became the primary concern as the highly-productive animals require considerable attention, protection, and treatment. The potential for increasing livestock production is also directly related to the supply of quality feedstuffs. This role was basically assigned to the nutrition specialist. Animals are able to convert inedible materials into high-grade

proteins, relatively efficiently. Hence, they are of great significance to man.

The extent of economic losses suffered by dairy animals due to diseases and parasites is not known with any accuracy in our country. The mortality rate in young animals is so high that productive animals are lost before they mature.

No systematic work has been done to find out the role of veterinary medicines and biological products in the animal economy. However, from rough estimates available, at least Rs 1,000 crores are being saved by using various types of veterinary biologicals and products in the market. For example, a few years ago the loss from Foot-and-Mouth Disease alone was estimated at Rs 500 million. Rinderpest was responsible for the loss of valuable animals to the tune of Rs 1,000 million in the 'seventies. Controlling these diseases through veterinary biologicals and medicines has helped the Indian farmer overcome these problems.

The first major thrust towards scientific animal health care came in 1888 with the establishment of Indian Veterinary Research Institute which also produces vital animal vaccines and sera. Soon this was followed by the establishment of veterinary biological institutes in several states. While vaccinations are necessary to prevent widespread epidemics of infectious diseases, there was utmost need to treat animals suffering from various diseases.

The pattern of animal diseases vary widely from region to region, and are caused by various factors such as viral, bacterial, rickettsial, protozoal, helminths, as well as those spread by ecto-parasites. Therefore the need of the day was to have a number of veterinary drugs which could control various diseases caused by the above entities. Veterinary drugs can be defined as chemicals that modify the functions of living animals. They may act therapeutically by modifying cells, tissues, organs, or systems, or promoting growth. The modifying agents include drugs that act specifically on various body systems to correct particular conditions.

With the increase in the number of productive animals and the coming in of dairy cooperatives, there was need to provide efficient veterinary coverage for which a number of institutions came into being. The number of veterinarians rose from merely 8,500 in 1965 to 38,500 by 1985; and the number of veterinary dispensaries increased from 5,900 in 1965 to 23,500 in 1985.

This happened because the report of the National Commission on Agriculture warned that until and unless due care to develop veterinary medicines was taken, progress in the animal husbandry sector would come to an end. The Commission also stated that the State Governments should start allocating more and more budgets for animal health care, providing them to poor farmers.

Till 1965, there were only a few companies operating in the veterinary field, notable amongst them were May & Baker, Pfizer, Merck Sharp & Dohme, Cyanamid and ICI. These companies were basically operating in the veterinary field, taking line extensions of their pharmaceutical products and substituting them with some of their veterinary specialities. The pharmaceutical industry did not pay much attention, basically because the market was too small, and the animals were not adequately cared for.

Subsequently, the crossbreeding programmes initiated by the Government of India to upgrade the population and the recommendation of the National Commission on Agriculture to allocate more funds for animal health activities gave tremendous boost to animal health market. By now pharmaceutical industry was being recognised as vital for the implementation of various animal husbandry development programmes. As farmers started recognising the value of their

animals, the health of animals became their prime concern. Milk became a continuous source of income for many of them for their livelihood, in addition to agriculture.

These activities in the Government, and the private sectors opened new vistas for veterinary medicines. Many national and international companies recognised the tremendous market for animal health products, and entered the field with their own products and services. At the end of 1970, only 19 well recognised companies were offering animal health products in the Indian market, but by 1984, their number rose to 46. Besides, many small Indian companies jumped into the fray. In the beginning of the 'eighties, besides allopathic medicines, some companies came out with ayurvedic preparations, based on scientific formulations, in order to cater to minor diseases and small farmers. The launching of Operation Flood programme and the establishment of the National Milk Grid further helped in the development of veterinary medicines. By 1980 veterinary medicines achieved a turnover of Rs 350 million, from Rs 50 million in 1965. Further, an estimated 5 million animals benefitted from the output.

While the pharmaceutical industry was gearing up to provide modern medicament and keep pace with developments, they suffered a set back with the inclusion of veterinary medicines in the Drug Price Control Order of 1971. Consequently, the introduction of new drugs became a rarity, and the era of formulations came to an end. It was necessary for the Government to see that farmers get veterinary medicines at economic rates, but for the drug industry, it was a vital question of survival, as the entire operation became uneconomic for them.

The FERA dilution by many multinational companies, and the efforts of many organizations began to yield results from 1980 onwards, when many new drugs began to enter the market. The turnover of veterinary medicines doubled to immediately to Rs 860 million in 1985.

The annual turnover of veterinary pharmaceuticals went up twenty times from around Rs 50 million in 1965 to Rs 1,000 million in 1986 and a projected growth by the turn of the century to Rs 7,500 million. The estimated turnover of veterinary pharmaceuticals

for the above period is given below:

<u>Year</u>	<u>Estimated turnover in Rs</u>
1965	50 mill
1970	90 mill
1975	170 mill
1980	350 mill
1985	860 mill
1986 (provisional)	1,000 mill
1990 (anticipated)	2,000 mill
1995 (anticipated)	3,800 mill
2000 (anticipated)	7,500 mill

Productivity in animals is directly linked with breed, nutrition and disease control. The pharmaceutical industry not only took care of the disease control part of the programme, but also participated actively in providing nutritional support by introducing feed supplements.

One achievement of the pharmaceutical industry was the appointment of veterinarians for promoting their products. This single commercial step helped Indian farmers a great deal to know about the technical knowledge of cattle development and scientific dairying. The decision to invest in audio-visual education films also helped farmers to understand diseases and their control better. The active participation of the pharmaceutical industry in various cattle fairs -- regional and All India -- enabled farmers in understanding that healthy animals were essential to get optimum production. Thus, latest drugs were used for prevention and control of many dreaded diseases of livestock.

In fact, some of the pharmaceutical companies abroad developed special formulations for tropical climates despite the fact that the market was too small to sustain the cost of research.

Recognising the significant role of pharmaceutical industry in animal health care, the Government of India encouraged the production of vaccines and veterinary preparations. Even public sector undertakings started producing various common products. Vaccine production was stepped up, and the Indian Dairy Corporation installed a huge plant in Andhra Pradesh for the manufacture of food-and-mouth disease vaccine.

India's Seventh Five Year Plan (1985-90) aims to step-up veterinary facilities

substantially by increasing the number of veterinary hospitals and dispensaries, so as to provide at least one veterinarian for every 10,000 cattle. The pharmaceutical industry therefore will have to play quite a substantial role in backing up the government's plans to provide the necessary inputs.

The value of veterinary medicines in Indian market is currently estimated at Rs 860 million, which is just 3 per cent of the market for human medicines. The future of veterinary medicines seems to be bright, as seen along side. The pharmaceutical industry has undoubtedly played a supportive role in making the Indian dairy industry a successful commercial venture. ■

FODDER PRODUCTION UNITS (Continued from page 50)

production units with indigenous raw materials and components with the exception of the thermal panels which will be imported. During this phase, the fodder production units will be utilized to meet the immediate demand of fresh green fodder in the drought-stricken areas and will be made available to various government and cooperative institutions on lease/purchase basis. This will be followed by the third phase with the setting up of a plant for the manufacture of thermal panels, thus making the manufacture of FPU totally indigenous. ■

INFORMATION DATA "BANK"

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Maharashtra which has been traditionally deficient in milk production is today surplus in it. The key to this transformation is the assured market and remunerative prices to the rural producers.

Dairy Development in Maharashtra

NAVIN KUMAR, I.A.S.

Dairy Development Commissioner, Maharashtra

&

N.D. KOTNIS

General Manager, Greater Bombay Milk Scheme

AGRICULTURE in Maharashtra has its limitations owing to the limited irrigation potentials. Dairying, therefore, has come to be of considerable importance for providing alternative means of livelihood for the vast majority of farmers, both big and small as well as landless labour.

The key to dairy development in the state has been the assurance of a market with remunerative price at the doorstep of the rural producer, coupled with extension and inputs programme of Dairy Development Department, Government of Maharashtra.

As a result, this State which had been traditionally deficient in milk production is today surplus in it. The milk supplies reach far off corners of the country, including Calcutta. Every day, about 800,000 litres of milk is sent to West Bengal, Bihar and Madhya Pradesh. In the past few years, the annual output of milk has gone up significantly from the level of 1.6 million tonnes in 1980-81 to an anticipated 2.5 million tonnes, in 1986-87. These gains have resulted from the following well-planned strategy:

- Development of infrastructure for procurement and processing of milk in the rural areas of Maharashtra for giving ready market to the producers at their doorsteps round the year;
- Organising producers cooperative structure at the village, taluka and district level;
- Giving remunerative price, based on

cost of milk production with an emphasis on price incentive for cow's milk;

- Intensive programme of crossbreeding based on long-term planning;
- Supporting programmes of extension inputs, with special emphasis on fodder development and its preservation;
- Adequate animal health cover up to village level; and,
- Development of human skill, and aptitude for better animal husbandry practices and dairying.

PERFORMANCE PARAMETERS

The performance parameters of dairy development in the State are reflected in the significant strides made in the fields of milk procurement, distribution, cash flow to rural producers and effective extension service.

Procurement: The quantity of milk procured and marketed by Dairy Development Department achieved an impressive figure of 751,900 tonnes, out of a total production of 2,300,000 tonnes in the year 1985-86 -- 32.69 per cent as against the national average of 15 per cent.

<u>Year</u>	<u>Procurement Average (llpd)</u>
1981-82	10.70
1982-83	11.58
1983-84	14.09
1984-85	17.42
1985-86	20.60

Distribution as market milk: The market milk distribution for the five-year period ending 1985-86 shows an impressive growth as reflected below:

lakh litres/day

Year	Bombay	Other urban areas	Total
1981-82	9.60	1.65	11.25
1982-83	10.14	1.75	11.89
1983-84	10.40	3.16	13.56
1984-85	10.84	3.60	14.44
1985-86	11.21	4.39	15.60

Cash flow to rural producer: Payment to milk producers by way of price and commission to the dairy cooperatives during the past four years is given below:

Year	Rs crores
1982-83	113
1983-84	170
1984-85	203
1985-86	234

Besides liquid milk, the Dairy Development Department is marketing milk products like Energee, ghee, table butter, paneer, cheese, skim milk powder, white butter, ice cream, shrikhand and masala milk.

Dairy Extension Service: This includes training of farmers families in improved dairy and husbandry practices, fodder mini kits, supply of high progeny female buffalo calves to weaker section of rural society, supply of pregnant buffaloes from Bombay stables, supply of crossbred pregnant heifers and assistance to dairy cooperatives in the form of managerial subsidy, capital grants and assistance under NCDC schemes.

Future Development: Three new dairy plants are coming up in the rural areas at Baramati, Sangamner and Pusad. A 15-tonne milk drying capacity is being set up at Akola in Vidarbha region. Plans are under way for setting up of aseptic packaging stations in the rural areas for making further thrust in the liquid milk market. ■

Greater Bombay Milk Scheme

Pasteurized and bottled milk was on sale for the first time in India on December 15, 1950 in Bombay from the first large dairy set up at Aarey under the auspices of the Greater Bombay Milk Scheme (GBMS). Since then, two more dairies have been added in the city under GBMS, while another at Kurla is run in the cooperative sector. Together they process over one million litres of milk every day.

Today, GBMS meets 55 per cent of the demand of milk through its 3,914 milk booths and 1,021 institutions like hospitals, canteens and hotels. Besides, processing milk, the dairies also manufacture many dairy products.

Aarey Dairy: India's premier dairy plant at Aarey was inaugurated by Prime Minister, Jawaharlal Nehru, on 3rd March 1951. The dairy initially processed milk produced in Aarey Milk Colony by 16,000 cattle shifted from city limits of Bombay. Milk was also supplied by Kaira Dist Cooperative Milk Union at Anand. With the change in the policy of the Government of Maharashtra to produce more milk through farmers' cooperatives, the dairy now receives its supply from state dairy cooperatives. Its current processing capacity is 2.5 lakh litres/day and helps to meet the needs of consumers in the City's western suburbs between Bandra and Dahisar.

Worli Dairy: The Rs 4.2 million Worli Dairy is the second constellation in GBMS's milky way. Inaugurated on 7th November 1961, the Worli Dairy is the fruit of International Cooperation planned jointly by UNICEF, FAO and Dairy Development Department of Maharashtra. This Dairy gave a great impetus to rural milk production in Maharashtra. Worli Dairy has processing and packaging capacity of 4.5 lakh litres/day. It helps to meet the needs of consumers in the City's central and southern zones.

Mother Dairy, Kurla: Bombay's third dairy plant started in October 1975. Capable of handling, processing and packaging four lakh litres/day, it received assistance from the World Food Programme and designed to pack milk in polythene pouches. It helps to meet the needs of consumers in the City's eastern suburbs.

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Introduction of many new systems and methodologies in the Delhi Milk Scheme during the last 30 years marks a major contribution to the growth and modernization of dairy industry.

Delhi Milk Scheme

M.N. KHAN

General Manager (Technical), Delhi Milk Scheme

THE Delhi Milk Scheme (DMS), installed in 1959, is equipped with sophisticated and modern plants, machines and equipments. Besides processing and bottling of liquid milk on large scale, the Scheme has been engaged in the production of various milk products like roller and spray-dried milk powders, butter, ghee, casein, sterilized milk, butter oil, ice cream, recombined and reconstituted milk, all under one roof. However, powders, casein, butter oil, ice cream are no longer produced now. Introduction of many new systems and methodologies in the DMS during the past three decades marks a major contribution to the growth and modernization of dairy industry. A few more important ones are highlighted below.

Long-life sterilized milk: For the first time in India, an Elecster Plant has been installed to process milk and pack it in polythene pouches. The milk thus packed has an extended shelf life of at least 15 days at ambient temperature. The milk is electrically heated to 140°C for 12 seconds, homogenized and cooled to 20°C before packing it in pouches. The filling of milk can be done in 200 and 500 ml pouches as per one's requirements. The cost of packing per pouch of 200 ml is 17 paise and in case of 500 ml, it is 26 paise only. Besides handling plain milk, the unit can be profitably used for processing and packing of sweetened flavoured milk in polythene pouches of 200 ml. This is an ideal system since it is a single service

container, inexpensive in cost, light in weight and can be kept by consumers without refrigeration for several days to serve as cold drink. The most significant aspect of this plant is that it is a compact and self-contained unit where entire process of sterilization, homogenisation and packing is done without any steam or refrigeration.

Single service five-litre polythene pouches for bulk supply of milk: So far, the traditional system for bulk supply of milk has been through cans all over the country. Supply of milk in cans has its own limitations and drawbacks. To safeguard the hygienic quality of milk and at the same time to have a cent per cent pilfer-proof container, DMS has for the first time introduced five-litre pouches for bulk supply to replace milk in cans. Besides safeguarding the purity of milk, the system has also many other positive advantages as the container is non-returnable and also weighs less, thus bringing down the cost of transportation. The pouch-packing machine has been indigenously manufactured to fill 500 pouches per hour. The cost of packing per litre of milk comes to only about 25 paise which is quite low.

Silos for bulk storage: Provision of bulk storage of milk in dairy plants during milk handling is an essential part of equipping dairies. Larger the handling of milk, bigger the storage space required in a dairy. Also, factors like arrival time of milk, types of milk for handling and plant capacity and

rate of filling influence the requirement of storage space. Use of silo tanks with a storage capacity of one lakh litres each is considered to be ideal for larger dairies, handling over four lakh litres of milk per day. This reduces the number of batches of milk processed in a day and avoids repeated adjustments of its composition, too frequent change-over from one tank to another for filling and the like. The use of big-size silo tanks has an important bearing in stabilising SNF content of milk. The reconstituted milk can be kept stored at least from six to eight hours, preferably a day in advance. The air incorporated during reconstitution gets eliminated on storage. As a result, the assessment of SNF value by lactometer is more accurate and very close to actual SNF determined gravimetrically. Ultimately, this avoids considerable wastage of skim milk powder. To begin with, two, one-lakh-litre each, silo tanks are being installed in DMS.

Standardized milk: With the concept of blending milk to lower grade of fat and also to reduce its cost, the use of toned milk and double-toned milk came into existence in several dairies in the country. For considerable time, DMS also maintained supply of whole milk with 6.0 per cent fat and 9.0 per cent SNF, but due to shortfall in milk procurement, a special grade of milk termed as standardised milk with 4.5 per cent fat and 8.5 per cent SNF was introduced for the first time in India in 1965, which became quite popular and was later taken up by many other city milk schemes in the country.

Recombined milk: On account of wide variations in the procurement of raw milk like non-availability of required quantity of fresh raw milk, seasonal fluctuations and overall decline in milk production, milk plants in the country face acute problems of shortage of fat to meet the day-to-day commitment of milk supply, particularly during lean months. While shortage of SNF could be readily met by use of skimmed milk powder, the problem of fat shortage always remained unmanageable so much so that supply to consumers had to be curtailed on such occasions. For the first time in the country, this problem was overcome by DMS in 1962 when extraneous fat in the form of white butter, butter oil, ghee and cream was made use of in milk by recombination process. This enabled the DMS in maintain-

ing regular supply of milk throughout the year, irrespective of wide fluctuations in raw milk procurement.

Long-distance milk transportation: Way back in 1960, DMS faced the challenge of collecting and transporting milk from distant places in and around rural areas in Rajasthan and Gujarat which then lacked any worthwhile infrastructure for collection, chilling and refrigerated transport of milk to metro cities. Then, the focus was on collecting milk from the rural dairy belt in the Bikaner and Mehsana regions. The solution to the problem of transportation of milk from there to Delhi came in two different ways:

(a) Freezing raw milk: The resources of ice factory were utilized for freezing raw milk in its brine tanks in suitably designed containers. The raw milk collected from farmers was put into the brine tank within three to four hours of its production and taken out in 12 to 20 hours after freezing. The milk so frozen was transported in rail break-vans from Bikaner to Delhi. On arrival after a journey of 24 hours, milk was found in semi-solid frozen state, quite fresh in taste and smell. No physical or chemical deterioration was noted after defreezing the milk. This innovative method, introduced by DMS, continued to be used for several years and found convenient for handling large volumes. Subsequently, the setting up of a dairy plant with chilling stations for procurement and transportation of milk in insulated road and rail tankers made this indigenous technology obsolete, although it is still being used in newly developed areas where the development of infrastructure for modernized dairying is still in its infancy. The World Bank had popularized this system in their dairy project in Rajasthan.

(b) Evaporated milk: Another successful innovation that DMS evolved in its early days for long-distance haulage of milk from Mehsana, about 1,000 km away, was to send evaporated milk in 40-litre cans in refrigerated rail vans. Transportation costs were significantly cut down by concentrating milk to about 40 per cent total solids, thus reducing the volume of milk two and a half times. The evaporated milk on reaching its destination at DMS was reconstituted by adding water to it. No adverse changes, physical or chemical, were observed, and

neither any degradation in palatability or other organoleptic properties was noticed. As a result, the DMS procured milk on a large scale from the Mehsana District Cooperative Milk Union to the mutual benefit. Subsequently, this method of transporting milk was also adopted by other government milk schemes.

Procurement of milk: DMS has procured milk from Mathura District on a large scale within a record time. In a short period of a year or so, DMS started collecting nearly 50,000 litres of milk per day in the face of tough competition from many private enterprises, already operating in the area through contractors and middlemen. The main feature of milk collection from the area was procuring most of the milk directly from individual farmers along with some collection from cooperative societies without any middleman. Thus the price paid for milk was going directly to farmers. Another unique feature was the use of ice water for chilling milk. Surplus refrigeration available with many existing ice factories could be used for chilling water which in turn chills milk in the most efficient and economical manner, instead of building expensive fullfledged chilling centres in the initial stages.

Uninsulated vans for city milk distribution: For a long time, the use of insulated vans to keep milk cool was considered unavoidable for its city distribution within a radius of 15 to 20 km. As a result, the entire fleet of DMS milk distribution vans in the city had insulated bodies at a considerable cost. Recently, DMS has introduced a few uninsulated vans on experimental basis to study their suitability and the effect on the quality of milk sent for distribution. Trials conducted so far have not shown any adverse effect in the keeping quality of milk. The experiment has proved that there is no need for insulation of milk transport vans for distribution of milk in cities.

The vans are loaded directly from cold-store where milk is stored at a temperature of about 6°C. The inside body of the van being at room temperature and its back door kept open for most of the time while unloading crates of milk at distribution points, insulation of vans did not offer much additional advantage in keeping milk at a low temperature. Use of uninsulated

vans for distribution purposes is found to be quite suitable, and as such can eliminate the insulation of the body, thus effecting considerable reduction in the cost.

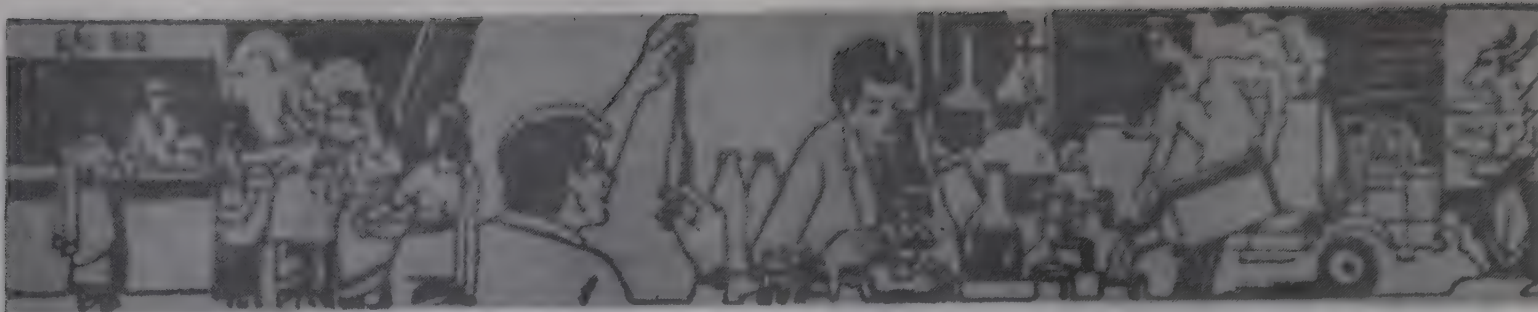
Training: The composite milk plant of DMS has a full range of modern equipment to process liquid milk in bottles and polypack as well as a wide range of products, including milk powder (roller and spray dried), butter, ghee, casein, sterilised milk, butter oil, ice cream and yoghurt. Not only dairy science students, but also officials of dairy development departments including NDDB, IDC and NDRI have benefited from training and practical experience gained here, and continue to do so even now. ■

PACKAGING OF DAIRY PRODUCTS (Continued from page 48)

GP paper. Products like lassi (sweetened butter milk) in 200 ml plastic pouches packed on FFS machine is a recent introduction in the Indian market. Sweet curd is packed in HIPS cups, while local vendors use LDPE bags for loose sale of fresh curd. There is not much of organised packing of khoya, and materials used vary from banana leaves to grease-proof paper and polyethylene films. ■

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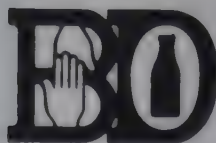
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Phase III of Operation Flood, being implemented during the Seventh Plan, seeks primarily to consolidate the extensive milk procurement and marketing base already built during the earlier two phases.

Operation Flood III: Major Tasks

INDIAN dairying is poised for a major breakthrough. Remunerative prices and marketing opportunities created under Operation Flood have already enabled small holder-milk producer to look after his milch animals and use them as a major resource for increasing income. India's dairying scene has witnessed certain major changes in the last 15 years. A farmers' cooperative infrastructure has emerged in 167 milksheds throughout India. Apart from directly handling some 7.9 million litres milk daily in the peak season of 1984-85, their cooperative infrastructure has considerably influenced producer prices paid by the traditional trade. Government outlay on developing the livestock sector has risen dramatically to a Sixth Plan outlay of Rs 8,499 million on animal husbandry and dairying. The crop residue availability has risen as a result of the green revolution by 40.5 per cent and concentrates availability by 42 per cent during 1977-82 as compared with that of 1961-66 generally improving feed availability. Operation Flood's major task has therefore, come to be that of organising milk procurement and marketing through professionally managed farmer owned organisations, modelled on the successful working of Kaira District Cooperative Milk Producers' Union Ltd, Anand.

Operation Flood Phase-III is based on the successful implementation of Operation Flood Phase-I and Phase-II programmes. Phase-I of the programme implemented during the period 1970 to March 1981 covered four

metro cities -- Delhi, Bombay, Calcutta and Madras, for milk marketing by linking with 18 hinterland milksheds in 10 states. Phase-II of the programme was designed to build on the foundation laid by Operation Flood Phase-I and IDA assisted dairy development programme in Karnataka, Rajasthan and Madhya Pradesh and was implemented during the Sixth Five-Year Plan period. At the end of Phase-II in March 1985, the scheme was in operation in 136 milksheds in the country and covered over 290 large, medium and small towns under the organized milk marketing.

Achievements at the end of Operation Flood Phase-I and Phase-II and targets for Phase-III are presented in Table 7.

The investments made in Operation Flood Phase-I and II are Rs 1,165.4 million and Rs 2,771.7 million respectively. As against this, the outlay proposed during the Phase-III is of the order of Rs 6,812.9 million. The resources and disbursements of funds under Operation Flood Phase-III are given in Table 9.

Phase-III of the project, being implemented during the Seventh Five-Year Plan period (1985-1990), seeks primarily to consolidate the extensive milk procurement and marketing base built during the second phase. It would endeavour to build further on an extensive foundation laid so far in some 136 milksheds of the country, to develop strong farmers' organizations controlled by member producers through their

elected representatives at all the three tiers and, manage their milk procurement, processing, marketing and inputs supply functions. The key targets for Phase-III are listed in Table 8.

Operation Flood Phase-III aims at increasing rural milk procurement to a peak of 18.3 million litres collected from over 8 million milk producer families by 1990. Over 12 million litres are proposed to be sold as fluid milk through urban markets. What is visualized is an increase in peak procurement by 132 per cent and an increase in milk marketing by about 148 per cent. Farmers will be paid almost Rs 20,000 million annually for milk by the cooperative structure by 1990. These targets as accepted are extremely difficult and will only be achieved to the extent a rational pricing policy can be evolved at both farm and the urban market level.

Much greater emphasis will therefore be placed on the marketing of fluid milk. Emphasis will also be placed on expanding marketing infrastructure in all major markets linking them to milksheds through the National Milk Grid (NMG) to ensure year round stable milk supply in these markets. To the extent that, based on the supplies of milk from NMG, a union is able to gain command of its liquid market, it will be able to further improve procurement. Marketing will thus become the driving force to improve procurement and strengthen the commercial viability of the unions.

Expansion of dairy capacities will be necessary in all metropolitan cities. Particular efforts will be made in creating and expanding dairy capacities in major demand centres outside Operation Flood milksheds like Jamshedpur, Bokaro, Rourkela and other industrial towns.

The role of NMG becomes critical in ensuring improved availability to the consumer and a remunerative price to the milk producer by evening out regional and seasonal imbalances in supply and demand.

As a part of their overall marketing strategy, the unions will also diversify and market a product-mix best suited to the requirements of each market. Marketing indigenous milk products will form an important part of the overall marketing strategy to enable the cooperatives compete more effectively with the traditional trade, who otherwise by virtue of higher margins on indigenous milk products and therefore ability to pay higher prices in the lean season are able to disrupt the cooperatives' milk procurement in the lean season.

PROCESSING FACILITIES

It is estimated that by 1990 some 20 million equivalent of rural milk processing facility with about 800 tonnes per day conservation facility would be required. Conservation facilities have an important role in offsetting the seasonal and regional imbalances in demand and supply. Experience gained during implementation of Phase-II,

TABLE 7. Programme achievements at the end of Phase-I & II of Operation Flood & target for Phase-III.

	Phase-I* (March '81) Achievement	Phase-II (March '85) Achievement	Phase-III (1985-90) Target
Investments (Rs million)	1,165.4	2,771.70	6,812.90
Village societies organised (nos.)	13,270.00	34,523.00	50,000.00
Farmer families covered (lakhs)	17.50	36.30	80.00
Average milk procurement (lkpd)	26.61	73.30	122.20
Rural dairy plants (lakh lpd): - capacity	45.40	87.75	200.00
- peak throughput	33.90	78.85	-
Urban milk marketing (lakh lpd)	29.95	49.54	124.20
Milk powder manufacturing capacity (MTD)	340.00	507.50	-
No. of milksheds	39.00	136.00	173.00

*including IDA projects.

TABLE 8. Operation Flood Phase-III — Yearwise key physical targets.

	Achievements as on March '85 (by the end of 6th plan)	85-86	86-87	87-88	88-89	89-90
No. of Anand Pattern DCS*	34,523	36,000	41,000	46,000	49,000	50,000
No. of Anand Pattern DCS Under AI	7,543	11,000	15,000	18,000	22,000	25,000
Milch animals under coop ambit (lakh)	54.46	77.99	96.22	116.21	134.52	152.80
Milk procurement build-up (lkpd): Average	57.84	65.70	77.60	91.40	102.20	122.20
Peak	78.98	98.60	116.40	137.10	153.30	183.30
Urban milk marketing (llpd)	50.11	53.55	63.72	78.50	96.50	124.20
Build-up of dairy capacity (llpd)	87.75	105.40	140.00	160.00	180.00	200.00

* Indicates the number of Dairy Cooperatives (DCS) only for the milksheds where Operation Flood implementation has been initiated/planned to be initiated and includes:

1. Existing Anand Pattern DCS
2. Traditional DCS converted/planned to be converted to Anand Pattern
3. Targetted new Anand Pattern DCS to be organised.

particularly in the last two years, has brought out the need to provide buffer conservation facilities to ensure that the cooperatives are not constrained by lack of these facilities when, owing to the vagaries of monsoon, in an usually favourable year for milk production, the member producers have more milk to offer for sale. Existing facilities would also need to be modernised to produce commodities of higher acceptability standards. Small, inefficient (energy expensive) plants are to be replaced by large energy-efficient, drying plants, and additional capacities are to be created to handle projected flush surpluses. Buffer conservation capacity equivalent to approximately 10 per cent of the projected flush surplus would also be created with unions who are expected to make major contribution to the National Milk Grid.

Incremental Processing capacities: During Phase-III, an incremental 11.2 million lpd processing and 200 tonnes/day drying capacity, along with matching fat handling facility would be required. Enlarged coverage of milkshed districts has also necessitated providing additional chilling capacity as support to link the dairy and their logical milksheds. Incremental 0.8 million lpd UHT aseptic packaging facility would

also be built to enable the modern dairy cooperative sector cover distant markets and, in larger cities/towns offer a wider choice of product-mix for those who can afford to and are willing to pay a higher price for milk. The incremental capacity is proposed to be achieved largely by expanding the existing dairies in the milksheds and, creating new capacities wherever required. Experience has shown that processing and conservation facilities must not only precede procurement build-up but must be at least 10 per cent more than any anticipated peak procurement. This alone can save the cooperatives the embarrassment of refusing their own members milk in flush season and adversely affecting indigenous conservation of milk solids. The project would, therefore, accelerate investment in processing facilities to keep them ahead of peak procurement build-up.

Operation Flood Phase-III investments in processing capacity would be disbursed as 70 per cent loan and 30 per cent grant. Investments required for modernizing and renovation of the existing dairy plants would be financed on 100 per cent loan basis. A provision of Rs 547.4 million has been made for this new item.

TABLE 9. Resources & disbursements of funds in Operation Flood-III.

Resources	Rs (millions)
Balance of Operation Flood-II funds carried to Operation Flood-III plus IDC's internal resources	3,314.20
External Assistance from the World Bank & EEC	3,498.70
Total:	6,812.90
<u>Disbursement of Funds under Operation Flood-III</u>	
Action item 1-4 (State Federations):	
1. Processing capacity	1,850.00
2. Technical inputs for milk production	450.00
3. Milk marketing systems	300.00
4. Support for village cooperative organisations	850.90
Action item 5-9 (Central Actions):	
5. Planning, information system, training & research	350.00
6. Project implementation	52.70
7. National milk grid and stabilization	282.40
8. Infrastructural support for disease control and milk production enhancement	585.00
9. Supplementary feeding programme	544.50
Sub-total:	5,265.50
10. Processing capacity renovation, modernisation and high margin products	547.40
Funds to be revolved as working capital assistance to Federations	1,000.00
Total:	6,812.90

INTENSIVE URBAN MARKETING

Modern urban dairy organizations have already begun to adopt enterprising consumer oriented approaches to marketing of milk and dairy products. It has also been realised that, in order to best serve the urban poor, the product mix of modern dairies must include socially oriented products coupled with high margin products. One such project, launched in Baroda in 1976, established the importance of adopting such an approach in other projects too. Under Phase-III, therefore, the concept would be extended to enable modern dairies market socially oriented products along with a combination of traditional Indian dairy

products -- manufactured using modern large scale production processes developed by NDDB's Applied Research and Development Division. Investments on high margin products component will be made under basic facilities while equipment required to manufacture and market socially oriented products would be provided under IDC's central action on supplementary feeding.

Consumer choice: As the sale of fluid milk becomes more critical owing to its increased availability to the cooperative sector, it will become necessary to progressively provide the consumer greater choice and convenience in order to ensure increasing demand and a remunerative price at the

farm level. With this objective in mind, cooperatives will be offering milk in a variety of packages and of qualities -- high fat milk for those who are used to it and toned milk for those who want less fat and wish to buy butter and ghee. The urban marketing system will have the choice of milk packaged or through bulk vending system.

UHT Milk: Finally, cooperatives will be developing increased availability of UHT (long-life) milk which provides the convenience of availability throughout the day and at the same time enable the feeder dairies to directly enter the urban city without development of additional capacities in major market centre itself. Thus UHT milk can be expected to provide a new dimension in competition to the urban dairy based on high quality milk and improve availability and convenience. Aseptically packaged UHT milk will account for about 10 per cent of milk marketed by the cooperatives.

Target sale of fluid milk: With these objectives in mind the project would aim at expanding the sale of fluid milk by the metro dairies to 4.35 million lpd in 1989-90 and in urban dairies other than metro dairies to 7.34 million litres a day -- a target of 11.69 million lpd. This essentially envisages an increase of 133 per cent over 1984-85.

Targeted marketing capacities: In order to achieve this, handling capacities in metro cities and mini-metro cities of India would be expanded from 4.15 million lpd to about 6.55 million lpd by 1989-90. Based on experience, part of this expanded handling capacity would be based on the development of packing stations in urban centres and bulk distribution linked to feeder dairies so as to avoid additional investments in urban infrastructure to the extent possible. Estimated Phase-III investments would be Rs 300 million for milk marketing.

NATIONAL MILK GRID

Maintaining adequate buffer stock of milk products (SMP and conserved fat) and ensuring supply of fluid milk to deficit areas through long distance movement of milk from surplus producing to high demand areas are the two most important functions of the Grid. To ensure a steady flow of pool commodities and fresh milk between the

ports, federations' feeder dairies and the major urban demand centres, the Indian Dairy Corporation (IDC) will expand its own commodity storage facilities (presently about 11,000 tonnes of SMP and 2,200 tonnes of fat storage and its fleet of long-distance milk tankers. During Phase-III, an additional some 5,000 tonnes of SMP and 2,000 tonnes of conserved fat storage capacity would be created. Rail milk tanker capacity -- presently 4 million litres including 0.8 million litres equivalent on order -- would be enlarged by an additional 1.8 million litres. Considering the extent of fluid milk demand which is expected to rise at least by the rate of population growth and the degree of seasonal uncertainties that exist in milk production, an estimated 60,000 tonnes of SMP and 20,000 tonnes of milk fat would be required to be maintained as buffer stock. Judging from the existing storage facilities which have been created under Operation Flood Phase-II in the major cities and at the state level, additional storage -- both godowns and cold stores -- would be built for the purpose of maintaining this level of buffer stock and also for ensuring efficiency and economy in the distribution of the conserved commodities throughout the country.

Aseptic milk packaging system: Aseptic milk packaging system introduced in Phase-II of the project would now be extended to cover 8 additional aseptic packaging stations (investments in UHT processing included in basic facilities), each of which would use a combination of packaging machines to enable them market both plain and flavoured long-life milk. Aseptic milk packaging system would thus give a larger number of state federations a direct access to urban milk markets enabling them to market milk as a grocery item. Additional marginal investments in an extruder and some ancillary equipment are contemplated for the paper laminating plant and the assembly lines for aseptic packaging/processing machines at Hindustan Packaging Co, Itola, set up under Phase-II, to enable production of foil laminated paper and make laminated paper in two passes -- an improvement over present system which takes four passes.

Combined Phase-III investments of Rs 282.4 million are envisaged on facilities required under grid movement, storage and aseptic milk packaging system.

PROCUREMENT & TECHNICAL INPUTS

During Phase-III, the cooperative organization in villages would be further enlarged to cover some 50,000 Dairy Cooperative Societies (DCS) in the project's ambit. Over 13,000 new DCS will be organized while greater emphasis would be laid on the process of enlarging the membership and milk procurement in the existing DCS.

Technical inputs for increased milk production: Experiences gained during Phase-I and Phase-II of Operation Flood indicate that inputs for milk production enhancement are expensive and that progressively increasing free supply of these inputs such as health cover often encumber and endanger the viability of the fledgling cooperative institutions under the project. The existence of vastly improved and widely distributed state infrastructure for free supply of essential technical inputs for milk production enhancement, now makes it unnecessary to duplicate the infrastructure build up in the cooperative system under Operation Flood Phase-III.

The proposal under Operation Flood Phase-III therefore is to optimise the use of available inputs from all sources and to marginally support with additional infrastructure, where necessary, with a view to provide the milk producer easy access to the essential technical inputs he needs to support and sustain the gradually increasing per capita production of the 15.3 million milch animals covered under the cooperative ambit. Phase-III strategies for inputs supply are therefore designed to maximise the use of the investments and infrastructure created under the state and central governments and Operation Flood Phase-I and II for the benefit of the rural milk producers.

Cattle feed plants: Experience has shown that veterinary health care and balanced cattle feed are the inputs most readily accepted and adopted by the rural milk producers. As the state and central governments machinery have not built up adequate capacities for balanced cattle feed compounding, this remains to be an item on which Operation Flood funds are needed for investment. Based on demand projections, Operation Flood Phase-III has provided for 10 additional cattle feed plants each with a capacity for production of 100 tonnes/day. Provisions are also made to expand

the capacities of the selected existing cattle feed plants and to promote maximum capacity utilization by all these plants. Estimated Phase-III investments would be Rs 147 million on this account.

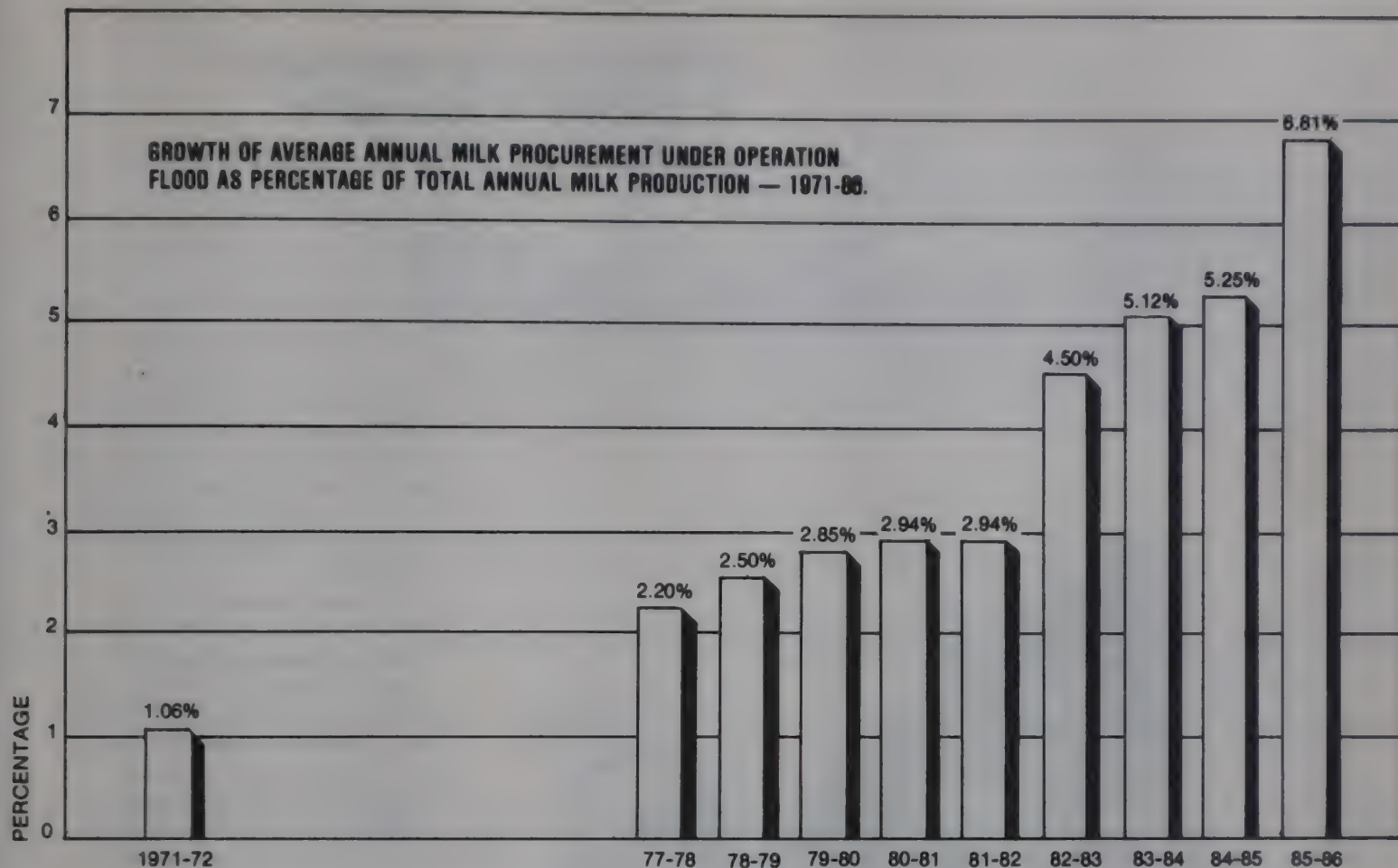
Veterinary Health Cover: All the DCS organized would be covered under a strengthened veterinary first-aid programme. An effective drive would be launched to link DCSs to existing state government veterinary institutions in the milkshed area, to the extent such linkings are permitted by logistics and spatial distribution of these institutions. This would be supplemented, where necessary, by a network of emergency mobile veterinary units of the milkshed unions. This would greatly help minimise the cost for health cover while ensuring expert veterinary intervention where such attention is needed. Estimated Phase-III investments would be Rs 150 million.

FMD Control: To initiate a control programme against FMD in selected milksheds and to minimise economic losses to the milk producers, a limited provision of funds is made under Phase-III. The provision is for the supply of FMD vaccine, creation of cold chain facilities for vaccine storage and handling and for extension services for increased farmers' awareness. Estimated Phase-III support would be Rs 75 million.

Breeding facilities: Under Operation Flood Phase-I and II, the project strived to create infrastructural facilities for an extensive AI network within the cooperative system. Under Operation Flood Phase-III, the approach is to link the vastly expanded AI network under the state/central government to the progressively expanding DCS network. By 1990, the AI network under the cooperative system and state infrastructure would have together covered some 25,000 DCS. Investments on AI within the cooperative system would, however, be restricted to the milkshed unions which are sound and viable business enterprises. Estimated Phase-III expenditure would be Rs 326.5 million.

Fodder development and production: The strategy for improved animal nutrition under Operation Flood Phase-III would be to promote technical programmes designed to increase the utilization and conversion efficiency of the crop residues and agricultural by-products. Here, investment

GROWTH OF AVERAGE ANNUAL MILK PROCUREMENT UNDER OPERATION FLOOD AS PERCENTAGE OF TOTAL ANNUAL MILK PRODUCTION — 1971-86.



for such facilities will be restricted to actual needs, and absence of existing facilities under the state machinery. Phase-III expenditure is estimated at Rs 76.6 million.

MILK PRODUCTION ENHANCEMENT PROGRAMME

Breeding: The existing bull mother farms for exotic and cross-bred bulls will be marginally strengthened to produce adequate number of breeding bulls; three new cross-bred bull mother farms and two buffalo bull mother farms will be established, and a least-cost programme for progeny testing of bulls and field recording will be supported under Operation Flood Phase-III. The project will provide for a bull calf rearing programme to speed up the availability of superior breeding bulls for AI and natural service. Estimated Phase-III investments would be Rs 116 million.

Applied research and development (ARD): In order to progressively minimise the input costs and thus the cost of milk production, the project will support applied research for exploring new dimension and new technologies.

Urea molasses lick manufacturing units

will be established under Operation Flood Phase-III mainly as additions to existing cattle feed plants or in other suitable locations.

To exploit the vast potential in buffalo productivity, the project would support research in adapting embryo transfer technology in cattle and buffaloes and will set up a laboratory and research facilities for embryo transfer, cloning and sexing of embryos.

The project would also continue to support the operations of the animal disease diagnostic laboratory of the NDDB at Anand for continued research in the field of emerging animal diseases.

Estimated Phase-III investments under ARD would be Rs 50 million.

FMD vaccine plant & FMD control project: With a view to expand the utilization of the facilities created in the FMD laboratory, Hyderabad, and to diversify its products, some provisions are proposed under Phase-III. The project will continue to support the FMD control project in southern districts at an estimated cost of Rs 300 million.

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Statistics

TABLE 10. Outlay and expenditure on animal husbandry and dairying in various Plan periods.

Rs million

Plan Periods	Animal Husbandry		Dairying		Animal Husbandry and Dairying	
	Approved Outlay	Expenditure	Approved Outlay	Expenditure	Approved Outlay	Expenditure
First Plan (1951-52 to 1955-56)	141.9	82.2	78.1	77.8	220.0	160.0
Second Plan (1956-57 to 1960-61)	385.0	214.2	174.4	120.5	559.4	334.7
Third Plan (1961-62 to 1965-66)	544.4	434.0	360.8	336.0	905.2	770.0
Annual Plans (1966-67 to 1968-69)	413.3	340.0	261.4	257.0	674.7	597.0
Fourth Plan (1969-70 to 1973-74)	941.0	755.1	1390.0	787.5	2331.0	1542.6
Fifth Plan (1974-75 to 1977-78)	NA	1784.3	NA	540.3	4375.4	2324.6
Annual Plan (1978-79)	NA	461.0	NA	404.2	1264.8	865.2
Annual Plan (1979-80)	543.9	468.8	651.9	753.7	1195.8	1222.5
Sixth Plan (1980-81 to 1984-85)	3896.4	3662.2	4603.0	4362.9	8499.4	8025.1
Seventh Plan (1985-86 to 1989-90)	6411.7	-	4934.7	-	11346.2	-

NA: Not available

Source: Annual Report of the Ministry of Agriculture, Dept of Agri & Coop, GOI, and Planning Commission documents.

TABLE 11. Value of output of dairy industry since 1951.

Rs million

Year	1951	1961	1971	1981	1985	1986	1990 (Proj)	2000 (Proj)
Value	8,700	10,200	19,125	75,460	126,900	131,700	204,000	325,000

TABLE 12. Trends in milk production, per capita availability, processing throughput, and milch animal population since 1951 and projected to 2000 AD.

Year	Human Population (in million)	Milch animal population (in million) Cows Buffaloes	Milk production (in million tonnes)	Per capita availability (in gm/day)	Milk processing throughput (in million lpd)	Throughput as percentage of total milk production
1951	361	46.37	17.4	132	0.2	0.4
1961	439	51.01	20.4	127	1.7	3.1
1971-72	548	53.41	22.5	112	3.5	3.8
1981-82	685	54.37	34.3	136	8.6	9.1
1983-84	720	-	37.1	141	9.3	9.2
1985-86	751	55.40	42.3	154	11.2	9.6
1986-87	766	-	43.9	157	13.4	11.2
1989-90 (Proj)	812	-	51.0	172	23.2	16.5
2000 AD (Proj)	986	51.25	65.0	180	35 to 45	20-25

TABLE 13. Regionwise distribution of milk production, population, and per capita availability in 1986-87.

Region	Population in million (% of total)	Milk Production in million tonnes (% of total)	Per Capita Availability in gm/day (% of the All India Average)
NORTHERN REGION	217.0 (28.3%)	19.53 (44.5%)	247 (+57.3%)
WESTERN REGION	108.8 (14.2%)	5.73 (13.1%)	144 (-8.3%)
SOUTHERN REGION	182.5 (23.8%)	9.22 (21.0%)	138 (-12.1%)
CENTRAL & EASTERN REGION	258.1 (33.7%)	9.42 (21.4%)	100 (-36.3%)
All India	766.4 (100)	43.9 (100)	157

NORTHERN REGION: Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh.
 WESTERN REGION: Dadra & Nagar Haveli, Goa, Gujarat, Maharashtra.
 SOUTHERN REGION: Andhra Pradesh, Karnataka, Kerala, Pondicherry, Tamil Nadu.
 CENTRAL & EASTERN REGION: Andaman & Nicobar, Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Sikkim, Tripura, West Bengal.

TABLE 14. Trends in milk production in the Sixth and Seventh Plans, statewise.

'000 tonnes

States/UTs	1984-85 Sixth Plan-end		1989-90 Seventh Plan	1986-87 Anticipated	1987-88
	Target	Achievement	Target	Achievement	Target
Andhra Pradesh	2,700.00	2,500.00	3,350.00	2,800.00	2,900.00
Arunachal Pradesh	35.00	35.00	43.00	37.00	38.00
Assam	560.00	549.00	710.00	592.00	616.00
Bihar	2,350.00	2,330.00	3,000.00	2,520.00	2,650.00
Gujarat	2,640.00	3,100.00	3,290.00	3,200.00	3,250.00
Haryana	2,400.00	2,400.00	3,160.00	2,700.00	2,800.00
Himachal Pradesh	380.00	404.12	515.00	445.00	467.00
Jammu & Kashmir	300.00	342.54	425.00	405.00	420.00
Karnataka	1,500.00	1,900.00	2,600.00	2,000.00	2,100.00
Kerala	1,163.00	1,220.00	1,500.00	1,345.00	1,410.00
Madhya Pradesh	2,784.00	2,784.00	3,500.00	3,069.00	3,220.00
Maharashtra	2,059.00	2,358.00	2,900.00	2,533.00	2,657.00
Manipur	65.00	66.00	90.00	72.00	75.00
Meghalaya	64.00	64.00	82.00	67.00	69.00
Mizoram	3.30	7.48	8.00	7.60	7.70
Nagaland	4.00	4.00	5.50	4.50	4.75
Orissa	280.00	334.00	475.00	346.00	360.00
Punjab	4,254.00	3,817.00	4,900.00	4,250.00	4,450.00
Rajasthan	3,800.00	3,500.00	4,500.00	3,800.00	4,000.00
Sikkim	22.00	20.20	27.00	23.00	24.25
Tamil Nadu	2,240.00	2,846.00	3,300.00	3,100.00	3,200.00
Tripura	22.50	22.00	31.00	24.50	26.00
Uttar Pradesh	6,830.00	7,100.00	9,210.00	7,727.00	8,191.00
West Bengal	1,499.00	2,210.00	3,000.00	2,610.00	2,700.00
<u>Union Territories</u>					
Andaman & Nicobar	2.50	12.60	17.40	13.50	14.00
Chandigarh	21.00	20.90	32.00	25.00	27.00
Dadra & Nagar Haveli	1.85	1.85	2.50	2.00	2.15
Delhi	182.00	182.00	220.00	198.00	205.00
Goa, Daman & Diu	30.00	25.00	35.00	28.00	29.50
Lakshadweep	0.75	0.70	1.50	0.85	0.90
Pondicherry	10.00	16.23	22.00	19.00	19.50
Total	38,202.90	40,172.62	50,951.90	43,963.95	45,933.75

TABLE 15. Anticipated growth in animal husbandry and dairying between 1985 and 1990.

Item	Unit	Base Level 1984-85	Target 1989-90
Milk production	million tonnes	40.2	51.00
Annual growth rate of milk production	per cent	4.6	6.8
Per capita milk availability	gm/day	149	172
Fodder seed production farms	number	83	109
Forage seed output	quintals	3,250	16,500
Animal health:			
a. Rinderpest eradication vaccinations	million	58	60
b. FMD control vaccinations			
Polyvalent	million	5.5	20.0
Monovalent	million	0.6	2.5
Veterinary hospitals and dispensaries	thousand	14.8	19.5
Veterinary aid centres	thousand	19.0	22.4
Bulls under progeny testing scheme	number	173	340
Frozen bull semen stations	number	47	62
Frozen semen doses	thousand	550	500
Inseminations with exotic bull semen	million	8.4	18.4
Bulls produced at CCEFs	number	450	480
Herd registration scheme:			
a. Milk recording centres	number	128	146
b. Animals under primary registration	number	9,000	30,000
Operation Flood-III:			
Anand Patern societies	number	34,523	50,000
Farm families covered	million	3.5	8.0
Milk procurement	llpd*	57.8	122.20
Milk marketing	llpd*	50.11	124.20
Dairy processing capacity	llpd*	87.75	200.00
Milch animals in cooperative ambit	million	5.4	15.2

*llpd: lakh litres per day.

TABLE 16. Distribution of major pockets of milk production, statewide and regionwise.

'000 litres per day

NORTHERN REGIONDelhi (540)

Gazipur, Jharoda, Kakrola, Madanpur, Nangloi

Haryana (5,471)

Rohtak (720), Hisar (700), Kurukshetra (590), Karnal (580), Gurgaon (540), Bhiwani (440), Jind (430), Ambala (390), Sirsa (365), Sonapat (360), Mahendragarh (342)

Punjab (10,410)

Jalandhar (1,200), Amritsar (1,150), Sangrur (1,100), Ludhiana (1,020), Patiala (1,000), Bhatinda (830), Faridkot (820), Firozepur (750), Hoshiarpur (700), Gurdaspur (600), Rupnagar (430)

Rajasthan (9,100)

Jaipur (700), Alwar (680), Bikaner (640), Jodhpur (450), Jhunjhunum (290), Ajmer (290), Ganganagar, Bharatpur, Sikar, Nagpur, Udaipur, Jalor

Uttar Pradesh (18,400)

Meerut (720), Moradabad (610), Aligarh (580), Muzaffarnagar (540), Bulandshahr (530), Saharanpur (520), Allahabad (490), Ghaziabad (470), Agra (470), Kanpur (460), Mathura (380), Etah (360), Varanasi (310), Mirzapur (310), Sitapur (300)

WESTERN REGIONGujarat (8,800)

Mehsana (1,100), Kheda (860), Banaskantha (820), Junagadh (640), Sabarkantha (580), Ahmedabad (530), Rajkot (480), Kachchh (470), Vadodara (390), Surat (340)

Maharashtra (5,700)

Kolhapur (430), Aurangabad (416), Yavatmal (415), Nashik (412), Pune (383), Jalgaon (349), Dhule (343), Osmanabad (325), Bir (279), Satara (273), Solapur (269), Sangli (239)

SOUTHERN REGIONAndhra Pradesh (4,270)

Guntur (540), Prakasam (406), East Godavari (395), Krishna (379), West Godavari (347), Chittoor (330), Cuddapah (326), Kurnool (285)

Karnataka (5,521)

Bangalore (1,273), Shimoga (600), Mysore (550), Hassan (460), Belgaum (440), Dharwad (430), Tumkur (390), Raichur (380), Bijapur (370), Dakshin Kannad (330), Gulbarga (310)

Kerala (3,700)

Trivandrum, Ernakulam-Cochin, Cannanore, Palghat, Calicut, Kottayam

Tamil Nadu (8,500)

Salem, Madurai, Erode, Coimbatore, North Arcot, Chengalpattu, Dharmapuri, Nilgiris, Attur, Pudukkottai, Thanjavur, Madras, Tiruchirapalli

CENTRAL & EASTERN REGIONSBihar (3,696)

Begusarai (680), Rohtas (605), Gaya (420), Patna (370), Saran (360), East Champaran (345), Saharsa (325), Munger (295), Muzaffarpur (263)

Madhya Pradesh (4,273)

Ujjain, Indore, Bhopal, Gwalior, Sagar, Jabalpur, Raipur

West Bengal (7,100)

24-Parganas (2,090), Midnapore (1,000), Burdwan (670), Hooghly (480), Nadia (410), Bankura (410), Murshidabad (300), Jalpaiguri (290), Malda (260), Darjeeling (230), West Dinajpur (200), Birbhum (200), Koch Bihar (200), Howrah (190)

TABLE 17. Value of output from agriculture and livestock in 1984-85.

(Rs '000 Mill)

	At current prices				At 1970-71 prices			
	1970-71	1980-81	1983-84	1984-85*	1970-71	1980-81	1983-84	1984-85*
AGRICULTURE								
Cereals	82.8	204.2	305.2	281.2	82.8	104.8	121.1	116.2
Rice	46.0	112.3	178.4	162.0	46.0	59.1	65.1	63.3
Wheat	18.7	52.5	75.9	72.3	18.7	28.3	35.5	34.4
Pulses	9.9	31.8	42.6	46.3	9.9	9.6	11.4	10.5
Oilseeds	18.2	41.5	70.6	71.7	18.1	16.9	22.2	23.2
Sugar, etc	10.5	40.1	37.3	41.1	10.5	12.9	14.0	13.8
Fibres	8.5	19.0	25.7	32.4	8.5	11.3	11.7	13.6
Fruits & vegetables	17.9	48.1	70.8	70.3	17.9	22.1	23.3	23.7
Miscellaneous crops ⁺	8.9	22.2	32.0	33.6	8.9	8.7	9.2	9.0
By-products	11.1	29.1	35.8	36.6	11.1	12.0	12.4	12.2
Straw & stalks	9.1	22.8	26.5	27.1	9.1	9.6	9.9	9.6
Other products**	1.9	6.3	9.3	9.5	1.9	2.4	2.4	2.6
Total value of output	175.3	452.1	643.8	646.7	175.3	207.5	234.6	232.4
LIVESTOCK								
Milk & milk products	21.7	62.7	91.2	105.4	21.7	30.7	32.7	33.4
Unprocessed milk	13.3	40.7	59.3	68.2	13.3	19.5	20.9	21.4
Ghee	5.3	14.2	20.8	24.7	5.3	7.2	7.5	7.7
Butter	0.9	2.4	3.6	4.1	0.9	1.3	1.3	1.4
Lassi	2.2	5.5	7.6	8.3	2.2	2.7	2.9	3.0
Meat & meat products	2.9	10.6	15.3	17.4	2.9	4.0	4.4	4.6
Hides & skins	0.7	2.3	2.6	3.1	0.7	0.8	0.9	0.9
Eggs & poultry meat	2.1	7.7	12.6	14.7	2.1	3.8	4.7	5.1
Wool & hair	0.2	0.7	0.9	0.9	0.2	0.3	0.3	0.3
Dung	3.2	10.0	14.3	15.4	3.2	3.8	4.0	4.1
Increment in livestock	0.6	2.5	4.0	4.7	0.6	1.0	1.3	1.4
Other products ⁺⁺	0.5	1.6	2.8	3.4	0.5	0.8	0.9	1.0
Total value of output	32.0	98.1	143.8	165.0	32.0	45.2	49.4	50.9

* Provisional estimates

+ Includes fodder, grass, farm-yard wood

**Includes rice bran, rice husk, sesamum sticks, bagasse and cane-trash

++Includes bones, horns, hoofs and cocoons

Source: National Accounts Statistics (1970-71-1984-85) of January 1987, pp 110-115, published by Central Statistical Organization (GOI).

TABLE 18. Consumption expenditure in domestic market by value and percentage.
(Rs '000 Mill)

Items	At current prices				At 1970-71 prices			
	1970-71	1980-81	1984-85*	1985-86+	1970-71	1980-81	1984-85*	1985-86+
Food	190.2 (63.8)**	523.9 (57.6)	790.1 (54.1)	873.5 (53.4)	190.2 (63.8)	242.8 (57.6)	270.3 (54.1)	273.4 (54.9)
Cereals, etc	86.0 (28.8)	200.6 (22.1)	268.7 (18.4)	303.3 (18.6)	86.0 (28.8)	109.0 (26.5)	111.9 (23.1)	116.1 (23.3)
Milk & milk products	22.9 (7.7)	64.1 (7.0)	110.8 (7.6)	114.7 (7.0)	22.9 (7.7)	32.2 (7.8)	35.9 (7.4)	36.4 (7.3)
Edible oils	15.5 (5.2)	47.9 (5.3)	78.5 (5.3)	69.2 (4.2)	15.5 (5.2)	19.5 (4.7)	24.5 (5.1)	22.0 (4.4)
Meat, egg & fish	7.8 (2.6)	26.6 (2.9)	48.1 (3.3)	57.7 (3.5)	7.8 (2.6)	10.4 (2.6)	12.6 (2.6)	13.3 (2.7)
Sugar	13.3 (4.5)	57.6 (6.3)	73.5 (5.0)	93.5 (5.7)	13.3 (4.5)	15.5 (3.8)	20.8 (4.3)	22.6 (4.5)
Salt	0.7 (0.2)	1.6 (0.2)	2.3 (0.2)	2.4 (0.2)	0.7 (0.2)	0.8 (0.2)	0.8 (0.2)	0.8 (0.2)
Other food, etc	44.0 (14.8)	125.5 (13.8)	208.3 (14.3)	232.8 (14.2)	44.0 (14.8)	55.5 (13.5)	63.8 (13.2)	62.1 (12.5)
Tobacco, intoxicants, etc	13.8 (4.6)	36.4 (4.0)	52.6 (3.6)	54.6 (3.3)	13.8 (4.6)	20.0 (4.9)	21.3 (4.4)	20.1 (4.0)
Clothing & footwear	21.2 (7.1)	88.6 (99.7)	147.7 (10.1)	165.5 (10.1)	21.2 (7.1)	37.4 (9.1)	48.9 (10.1)	50.2 (10.1)
Fuel & power	10.3 (3.5)	34.0 (3.8)	69.9 (4.8)	75.9 (4.7)	10.3 (3.5)	13.7 (3.2)	17.4 (3.6)	18.9 (3.8)
Rent	10.6 (3.5)	28.3 (3.1)	38.4 (2.6)	44.4 (2.7)	10.6 (3.5)	14.8 (3.6)	17.0 (3.5)	17.6 (3.6)
Household goods, etc	8.9 (3.0)	36.6 (4.0)	60.0 (4.1)	68.4 (4.2)	8.9 (3.0)	14.4 (3.5)	18.3 (3.8)	19.9 (4.0)
Medical care & health	6.1 (2.0)	17.2 (1.9)	27.7 (1.9)	n a n a	6.1 (2.0)	10.7 (2.6)	11.8 (2.5)	n a n a
Transport, etc	14.9 (5.0)	76.1 (8.4)	158.6 (10.9)	192.5 (11.8)	14.9 (5.0)	28.6 (6.9)	42.2 (8.7)	46.6 (9.4)
Education & recreation	11.0 (3.7)	29.8 (3.3)	52.0 (3.6)	n a n a	11.0 (3.7)	13.2 (3.2)	17.1 (3.5)	n a n a
Miscellaneous	11.3 (3.8)	38.6 (4.2)	62.5 (4.3)	160.5 (9.8)	11.3 (3.8)	15.9 (3.9)	19.3 (4.0)	50.8 (10.2)
Total	298.4 (100.0)	909.4 (100.0)	1459.6 (100.0)	1635.6 (100.0)	298.4 (100.0)	410.9 (100.0)	483.7 (100.0)	497.6 (100.0)

* Provisional estimates

+ Quick estimates

**Figures in brackets show percentage

n a Not available

Source: National Accounts Statistics (1970-71-1984-85) of January 1987, pp 36-39,
published by Central Statistical Organization (GOI).

TABLE 19. Bovine population trends — 1951-1982.

	million						
Categories	1951	1956	1961	1966	1972	1977	1982
<u>CATTLE</u>							
<u>FEMALES OVER 3 YEARS</u>							
Breeding:							
In Milk	18.96	20.10	20.72	20.97	22.03	23.19	23.23
Dry and not calved even once	27.41	27.15	30.29	30.80	31.38	31.43	27.48
Total	46.37	47.25	51.01	51.77	53.41	54.62	50.71
Cows used for work only and not in use for work or breeding	3.50	2.64	3.31	2.91	2.99	2.98	1.34
<u>MALES OVER 3 YEARS</u>							
Used for breeding only	0.65	0.44	0.38	0.43	0.39	0.41	66.60
Working bullocks	58.47	62.48	68.60	69.18	70.57	71.24	
Used both for breeding and work	NA	NA	1.98	2.26	1.99	1.99	
Not in use for breeding or work	2.68	1.96	1.52	1.47	1.51	1.27	
<u>YOUNG STOCK</u> (males & females)	43.56	43.80	48.87	48.08	47.48	47.63	49.53
Total	155.24	158.57	175.67	176.10	178.34	180.14	190.89*
<u>BUFFALOES</u>							
<u>FEMALES OVER 3 YEARS</u>							
Breeding:							
In Milk	10.22	11.81	12.58	12.92	15.07	16.96	15.79
Dry and not calved even once	10.79	9.86	11.66	12.59	13.54	14.31	12.53
Total	21.01	21.67	24.24	25.51	28.61	31.27	28.32
Buffaloes used for work only and not in use for work or breeding	0.85	0.67	0.79	0.63	0.63	0.60	0.24
<u>MALES OVER 3 YEARS</u>							
Used for breeding only	0.31	0.33	0.29	0.33	0.22	0.22	0.55
Working buffalo bullocks	6.03	5.95	6.61	6.97	7.01	7.32	5.35
Used both for breeding and work	NA	NA	0.51	0.62	0.60	0.61	
Not in use for breeding or work	0.46	0.22	0.26	0.27	0.23	0.22	1.76
<u>YOUNG STOCK</u> (males & females)	14.75	16.07	18.45	18.59	20.12	21.79	21.23
Total	43.41	44.91	51.15	52.92	57.42	62.03	68.78*

NA: Not Available

*Includes census data for Gujarat, Jammu & Kashmir, Rajasthan and Tamil Nadu, for which break-up is not available.

TABLE 20. Statewise census of crossbred cattle (CBC), indigenous cattle (IC) and buffaloes (B) in 1982.

'000

State/UTs	Year	Males over three years					Females over three years								Grand Total
		Used for breeding only	Used for both breeding and work	Others	Total	Breeding									
						In milk	Dry	Not calved even once	Others	Total	Young stock	Total Males, Females & Young stock	C		
1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Andaman & Nicobar	CBC 1982	-	-	-	1*	a	a	a	-	-	1	2	C =	36	
	IC 1982	-	-	-	11	5	5	1	-	11	12	34	B =	12	
	B 1982	a	4	-	4	2	2	a	-	4	4	12			
Andhra Pradesh	CBC 1983	-	-	-	35*	40	19	9	3	71	64	170	C =	13,117	
	IC 1983	-	-	-	5,143	1,635	1,659	557	443	4,294	3,510	12,947	B =	8,724	
	B 1983	76	192	829	1,097	2,585	1,280	393	88	4,346	3,281	8,724			
Arunachal Pradesh	CBC 1977	-	-	-	-	-	-	-	-	-	-	-	C =	168	
	IC 1977	-	-	-	57	26	21	5	10	62	49	168	B =	12	
	B 1977	1	a	1	2	2	3	a	1	6	4	12			
Assam	CBC 1982	-	-	-	16*	35	17	5	-	57	72	145	C =	6,750	
	IC 1982	-	-	-	2,516	1,190	642	112	126	2,070	2,019	6,605	B =	767	
	B 1982	36	164	-	200	149	63	39	-	251	316	767			
Bihar	CBC 1982	-	-	-	52*	29	19	4	-	52	46	150	C =	16,359	
	IC 1982	-	-	-	7,643	1,418	2,502	274	-	4,194	4,372	16,209	B =	4,622	
	B 1982	43	764	-	807	1,268	816	141	-	2,225	1,590	4,622			
Chandigarh	CBC 1982	-	-	-	a	1	a	a	-	1	2	3	C =	6	
	IC 1982	-	-	-	2	1	a	a	-	1	a	3	B =	19	
	B 1982	a	a	-	a	10	3	a	-	13	6	19			
Dadra & Nagar Haveli	CBC 1982	-	-	-	a	a	a	a	-	-	a	a	C =	44	
	IC 1982	-	-	-	20	3	9	1	-	13	11	44	B =	4	
	B 1982	a	2	-	2	1	1	a	-	2	a	4			

TABLE 20. (contd) Statewise census of crossbred cattle (CBC), indigenous cattle (IC) and buffaloes (B) in 1982.

'000

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Delhi	CBC 1983	-	-	-	1*	2	a	a	-	2	1	4	C =
	IC 1983	-	-	-	9	15	4	1	-	20	18	47	C =
	B 1983	1	3	-	4	88	10	2	-	100	72	176	B =
Goa	CBC 1982	-	-	-	a	1	a	a	-	1	1	2	C =
	IC 1982	-	-	-	52	13	19	4	-	36	40	128	C =
	B 1982	1	9	-	10	11	7	2	-	20	14	44	B =
Gujarat	CBC 1982	-	-	-	15	12	3	1	-	-	22	53	C =
	IC 1982	-	-	-	3,055	1,061	749	132	-	-	1,944	6,941	6,994
	B 1982	50	-	-	50	1,620	790	148	500	3,058	1,335	4,443	4,443
Haryana	CBC 1982	-	-	-	-	-	-	-	-	-	-	-	C =
	IC 1982	-	-	-	-	-	-	-	-	-	-	-	C =
	B 1982	-	-	-	-	-	-	-	-	1,641	-	3,365	B =
Himachal Pradesh	CBC 1982	-	-	-	33*	29	13	6	-	48	43	124	C =
	IC 1982	-	-	-	821	308	272	65	-	645	584	2,050	C =
	B 1982	5	8	-	13	221	165	28	-	414	189	616	B =
Jammu & Kashmir	CBC 1982	-	-	-	-	-	-	-	-	-	-	161	C =
	IC 1982	-	-	-	-	-	-	-	-	-	-	2,151	C =
	B 1982	-	-	-	-	-	-	-	-	-	-	555	B =
Karnataka	CBC 1983	-	-	-	99*	107	61	23	28	293	194	512	C =
	IC 1983	-	-	-	3,534	1,355	1,516	221	587	3,679	2,993	10,206	C =
	B 1983	20	71	191	282	1,026	848	100	48	2,022	1,306	3,610	B =
Kerala	CBC 1982	-	-	-	20*	471	211	43	2	727	706	1,453	C =
	IC 1982	-	-	-	246	393	350	41	2	786	612	1,644	C =
	B 1982	3	13	167	183	83	49	6	1	139	87	409	B =
Lakshadweep	CBC 1982	-	-	-	a	1	a	a	-	-	a	1	C =
	IC 1982	-	-	-	a	1	1	a	-	-	a	2	C =
	B 1982	-	-	-	-	-	-	-	-	-	-	-	B =
Madhya Pradesh	CBC 1982	-	-	-	8*	16	8	1	-	25	32	65	C =
	IC 1982	-	-	-	9,919	3,613	4,508	149	-	8,270	8,728	26,917	C =
	B 1982	70	1,137	-	1,207	1,389	1,355	48	-	2,792	2,416	6,415	B =
Maharashtra	CBC 1982	-	-	-	74*	126	58	18	8	210	202	486	C =
	IC 1982	-	-	-	6,545	1,947	2,556	410	62	4,975	3,931	15,451	C =
	B 1982	19	29	303	351	1,245	855	173	34	2,307	1,300	3,958	B =

TABLE 20. (contd) Statewise census of crossbred cattle (CBC), indigenous cattle (IC) and buffaloes (B) in 1982.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
																'000
Manipur	CBC 1982	-	-	-	-	-	-	-	-	-	-	15	-	62	C =	747
	IC 1982	-	-	-	-	-	-	-	-	-	-	145	-	685	B =	138
	B 1982	-	-	-	-	-	-	-	-	-	-	68	-	138		
Meghalaya	CBC 1982	-	-	-	-	2*	5	3	3	2	-	10	6	18	C =	550
	IC 1982	-	-	-	-	126	81	63	63	34	-	178	228	532	B =	29
	B 1982	1	6	1	7	4	4	4	4	2	-	10	12	29		
Mizoram	CBC 1982	-	-	-	-	a	1	1	1	a	-	-	a	2	C =	48
	IC 1982	-	-	-	-	8	8	6	6	3	-	17	21	46	B =	4
	B 1982	a	1	a	1	1	1	1	1	a	-	2	1	4		
Nagaland	CBC 1982	-	-	-	-	6*	7	3	3	3	-	13	13	32	C =	151
	IC 1982	-	-	-	-	20	23	12	12	10	-	45	54	119	B =	9
	B 1982	a	3	a	3	3	1	1	1	1	-	3	3	9		
Orissa	CBC 1982	-	-	-	-	22*	52	26	26	17	-	95	110	227	C =	12,930
	IC 1982	-	-	-	-	4,827	1,614	1,888	1,888	661	-	4,163	3,713	12,703	B =	1,333
	B 1982	35	525	35	560	181	181	165	165	53	-	399	374	1,333		
Pondicherry	CBC 1982	-	-	-	-	1*	8	3	3	1	-	12	11	24	C =	93
	IC 1982	-	-	-	-	19	14	11	11	2	-	27	23	69	B =	9
	B 1982	a	1	a	1	1	3	2	2	a	-	5	3	9		
Punjab	CBC 1985	-	-	-	-	-	-	-	-	-	-	-	-	-	C =	3,312
	IC 1985	-	-	-	-	1,349	582	294	294	38	31	945	1,018	3,312	B =	4,110
	B 1985	11	46	11	193	250	1,354	695	695	68	49	2,166	1,694	4,110		
Rajasthan	CBC 1982	-	-	-	-	50	-	-	-	-	-	54	-	104	C =	13,466
	IC 1982	-	-	-	-	-	-	-	-	-	-	-	-	-	B =	6,035
	B 1982	-	-	-	-	-	-	-	-	-	-	-	-	-		
Sikkim	CBC 1982	-	-	-	-	5*	6	4	4	3	-	13	14	32	C =	172
	IC 1982	-	-	-	-	39	21	14	14	9	-	44	57	140	B =	4
	B 1982	a	a	a	a	1	1	a	a	a	-	1	3	4		
Tamil Nadu	CBC 1981	-	-	-	-	200*	186	111	111	38	-	335	286	821	C =	10,247
	IC 1981	-	-	-	-	3,695	1,464	1,275	1,275	414	-	3,153	2,578	9,426	B =	3,207
	B 1981	-	-	-	-	302	980	555	555	189	-	1,724	1,181	3,207		
Tripura	CBC 1982	-	-	-	-	4*	5	3	3	2	-	10	22	36	C =	680
	IC 1982	-	-	-	-	212	96	81	81	21	-	198	234	644	B =	16
	B 1982	1	3	1	4	2	2	3	3	1	-	6	6	16		

TABLE 20. (contd) Statewise census of crossbred cattle (CBC), indigenous cattle (IC) and buffaloes (B) in 1982.

'000

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Uttar Pradesh	CBC 1982	-	-	-	-	-	-	-	-	-	-	-	C =
	IC 1982	-	-	-	-	3,200	2,782	634	-	6,616	-	-	26,151
	B 1982	-	-	-	-	4,592	2,682	631	-	7,905	-	15,784	B =
West Bengal	CBC 1984	-	-	-	57*	143	63	30	-	236	240	533	C =
	IC 1984	-	-	-	5,090	2,513	1,675	495	-	4,683	5,343	15,116	15,649
	B 1984	43	525	-	568	133	61	21	-	215	203	986	B =
All India	CBC 1982	-	-	-	2,631*	1,564	844	269	41	2,879	2,740	8,250	C =
	IC 1982	-	-	-	63,967	21,666	22,225	4,147	1,303	51,492	46,791	1,62,250	1,90,895
	B 1982	550	5,352	1,759	7,963	15,788	10,552	1,977	237	28,554	21,233	68,776	B =

a = Below 500.

* = Males over 2½ years.

Note: As break-up of some states are not available, so totals do not always tally.

TABLE 21. Growth of village milk producers cooperatives (VMPCs) and milk procurement under Operation Flood and IDA-aided projects between 1970 and 1986.

Year	No. of VMPCs	Member Producers ('000)	Annual Milk Procurement (mill tonnes)
<u>OPERATION FLOOD-I</u>			
1970-71	1,588	278	0.1898
1971-72	1,811	327	0.2372
1972-73	2,200	361	0.2774
1973-74	2,598	394	0.2226
1974-75	2,966	445	0.3175
1975-76	4,533	562	0.4197
1976-77	7,681	723	0.5657
1977-78	9,306	943	0.6205
1978-79	10,099	1,213	0.7336
1979-80	11,436	1,475	0.8614
1980-81	13,270	1,747	0.9344
<u>OPERATION FLOOD-II</u>			
1981-82	18,422	2,124	1.0147
1982-83	23,496	2,620	1.6133
1983-84	28,614	3,116	1.9016
1984-85	34,523	3,632	2.1097
<u>OPERATION FLOOD-III</u>			
1985-86 (anticipated)	42,692	4,489	2.879

Source: National Dairy Development Board.

TABLE 22. Dairy cooperatives, producer members, milk procurement and technical inputs, under Operation Flood as on March 31, 1987 (Provisional).

Region/States	Anand Pattern Cooperatives	Producer Members ('000)	Average Annual Milk Procurement ('000 kg/day)	Technical Inputs*	
				AI Centres	Veterinary Routes
NORTHERN REGION					
Haryana	3,028	170	150	257	16
Himachal Pradesh	136	13	11	-	-
Jammu & Kashmir	105	4	7	-	-
Punjab	4,561	251	428	776	70
Rajasthan	4,193	251	455	547	76
Uttar Pradesh	5,190	264	354	626	66
Total	17,213	953	1,406	2,206	228
WESTERN REGION					
Goa	87	8	11	9	1
Gujarat	8,840	1,316	2,139	1,819	146
Madhya Pradesh	2,565	115	174	637	49
Maharashtra	3,370	695	1,686	304	31
Total	14,862	2,134	4,010	2,769	227
SOUTHERN REGION					
Andhra Pradesh	3,633	343	692	163	11
Karnataka	3,954	583	688	1,037	68
Kerala	689	109	111	143	17
Pondicherry	64	13	20	20	1
Tamil Nadu	5,549	821	790	1,743	89
Total	13,889	1,869	1,609	3,106	186
EASTERN REGION					
Andaman & Nicobar	20	1	0.3	7	-
Assam	125	1	4	9	1
Bihar	1,218	45	78	91	-
Nagaland	10	0.3	0.3	-	-
Orissa	391	17	18	118	7
Sikkim	114	3	4	30	-
Tripura	80	5	4	7	2
West Bengal	1,144	64	47.3	405	24
Total	3,102	136	156.3	667	34
Grand Total	49,066	5,092	7,181.3	8,748	675

*As on March 31, 1986

Source: National Dairy Development Board.

TABLE 23. Liquid milk throughput and use of imported skim milk powder and butter oil between 1950 and 1986.

'000 tonnes

Year	Throughput from indigenous sources in Coop, Public & Private Sectors (Total solids*)	Use of Imported Skim Milk Powder	Use of Imported Butter Oil/Ghee/White Butter	Total throughput	Total imports as percentage of total throughput
1950-51	3.5	6.7	0.5	10.7	67.3
1951-52	4.3	11.9	0.7	16.9	74.6
1952-53	7.5	9.7	0.3	17.5	57.1
1953-54	12.7	18.8	0.6	32.1	60.4
1954-55	18.3	27.9	0.5	46.7	60.8
1955-56	20.3	28.6	2.3	51.2	60.4
1956-57	21.9	31.6	0.2	53.7	59.2
1957-58	24.1	16.5	-	40.6	40.7
1958-59	27.2	38.5	-	65.7	58.6
1959-60	29.9	32.6	0.8	63.3	52.8
1960-61	33.9	18.8	-	52.7	35.7
1961-62	40.2	47.5	-	87.7	54.2
1962-63	42.1	42.1	-	84.2	50.0
1963-64	41.8	52.8	-	94.6	55.8
1964-65	54.4	25.0	9.4	88.8	38.7
1965-66	53.7	35.7	1.1	90.5	40.7
1966-67	82.0	46.1	0.8	128.8	36.4
1967-68	92.0	31.8	1.1	124.9	26.3
1968-69	108.7	45.4	1.5	155.7	30.1
1969-70	109.3	27.4	3.4	140.1	22.0
1970-71	111.7	19.0	1.3	132.0	15.4
1971-72	150.1	28.1	2.4	180.6	16.9
1972-73	148.2	27.0	3.2	178.4	16.9
1973-74	147.2	24.8	4.4	176.4	16.6
1974-75	139.0	28.4	3.8	171.2	18.8
1975-76	195.2	18.6	4.2	218.0	10.5
1976-77	226.9	20.2	10.7	258.0	12.1
1977-78	282.6	20.8	8.3	311.7	9.3
1978-79	270.8	27.3	4.3	302.4	10.4
1979-80	317.2	24.4	9.1	350.7	9.6
1980-81	353.3	28.3	11.8	393.4	10.2
1981-82	364.3	56.6	16.6	437.5	16.7
1982-83	383.3	41.4	10.6	435.3	11.9
1983-84	442.0	26.3	9.1	477.4	7.4
1984-85	470.1	41.8	11.1	523.0	10.1
1985-86**	540.1	25.9	8.2	574.1	5.9

*Total solids calculated on the basis of 14 per cent of liquid milk.

**Provisional.

Note: Commercial imports ceased since 1975-76. From 1970-71 onwards the figures are for actual issues by the IDC of imported SMP and BO.

Source: National Dairy Development Board.

TABLE 24. Growth of milk processing facilities, procurement and throughput of metropolitan dairies between 1980 and 1986.

City/Dairy	Capacity			Procurement			Throughput		
	March 1980	March 1985	March 1986	March 1980	March 1985	March 1986	March 1980	March 1985	March 1986
	'000 litres/day								
<u>BOMBAY</u>									
Aarey & Worli	700	700	700	573	694	558	631	665	651
Mother Dairy, Kurla	400	400	400	256	392	391	277	329	408
Mahanand	-	400	400	-	125	157	-	124	163
Total	1,100	1,500	1,500	829	1,211	1,106	960*	1,118	1,222
<u>DELHI</u>									
Delhi Milk Scheme	375	375	375	161	234	235	255	333	314
Mother Dairy, Delhi	400	600	650	273	508	431	345	648	533
Total	775	975	1,025	434	742	666	600	981	847
<u>CALCUTTA</u>									
Belgachia & Haringhatta	300	300	300	66	63	74	217	152	158
Mother Dairy, Calcutta	400	400	400	13	62	101	43	304	342
Total	700	700	700	79	125	175	260	456	500
<u>MADRAS</u>									
Madhavaram	125	125	125	119	125	164	170	178	195
Mother Dairy, Ambattur	200	200	200	69	180	250	78	254	284
Total	325	325	325	188	305	414	248	432	479
GRAND TOTAL	2,900	3,500	3,550	1,530	2,383	2,361	2,068	2,987	3,048

*Includes 52,000 litres supplied by private traders.

Source: Indian Dairy Corporation.

TABLE 25. Retail prices of milk in the metropolitan cities.

City/Milk	Rs/litre									
	Apr 1972	Apr 1975	Apr 1978	Mar 1980	Feb 1981	Dec 1982	Dec 1983	Mar 1984	Mar 1985	Mar 1986
<u>BOMBAY</u>										
<u>Milk Scheme</u>										
Whole milk (6.2% fat, 9% SNF)	1.70	3.10	3.20	3.40	4.30	5.00	6.00	6.00	6.00	6.00
Cow milk (4.4% fat, 8.5% SNF)	-	2.60	2.60	2.60	2.90	-	-	-	-	-
Standardised milk (4.5% fat, 8.5% SNF)	1.30	2.60	2.60	2.60	2.90	3.30	4.30	4.30	4.30	4.30
<u>DELHI</u>										
<u>Milk Scheme</u>										
Toned milk (3% fat, 8.5% SNF)	0.84	-	1.30	1.80	1.80	1.80	2.80	2.80	3.00	3.30
<u>Mother Dairy</u>										
Full cream milk (6.5% fat, 9% SNF)	-	-	3.00	3.20	3.20	4.00	4.20	4.20	5.10	5.20
Standardised milk (4.5% fat, 8.5% SNF)	-	-	2.00	2.20	2.20	3.10	3.50	-	-	-
Toned milk (3% fat, 8.5% SNF)	-	-	-	-	-	2.50	2.70	2.80	2.80	3.50
<u>CALCUTTA</u>										
<u>Milk Scheme</u>										
Cow milk (4% fat, 8.5% SNF)	1.72	2.50	3.00	3.00	3.00	-	-	-	-	-
Toned milk (3% fat, 8.5% SNF)	1.16	1.50	1.80	1.80	1.80	1.80	2.90	2.90	-	-
Double toned milk (1.5% fat, 9% SNF)	0.84	1.00	1.26	1.26	1.26	-	-	-	-	1.80
<u>Mother Dairy</u>										
Toned milk (3.2% fat, 8.6% SNF)	-	-	-	2.50	2.50	2.90	2.90	2.90	3.10	3.40
<u>MADRAS</u>										
<u>Milk Scheme</u>										
Standardised milk	1.30	2.00	2.00	2.00	2.50	3.00	3.30	3.30	3.30	4.00

TABLE 26A. Installed capacity of dairy plants and production of dairy products.

Item	1979-80	1982-83	1983-84	1984-85
No. of Dairy Plants	190	215	233	238
Daily average throughput of milk in public/cooperative sector Dairy Plants (Lakh litres)	62.0	75.00	86.5	92.5
<u>Installed Capacity and Production of Dairy Products (Tonnes)</u>				
<u>Milk Powder</u>				
Installed capacity of Dairy Plants	50,000	97,500	1,01,500	1,12,400
Production	32,600	35,000	47,000	53,800
<u>Infant Milk Food</u>				
Installed capacity of Dairy Plants	44,478	62,800	68,000	68,000
Production	35,500	39,700	45,800	41,800
<u>Malted Milk</u>				
Installed capacity of Dairy Plants	20,418	24,122	27,122	38,000
Production	22,547	22,270	18,800	23,100
<u>Condensed Milk</u>				
Installed capacity of Dairy Plants	13,300	21,786	21,786	21,786
Production	5,519	5,000	6,400	5,600

Source: Directorate of Economics & Statistics, Ministry of Agriculture, Govt of India.

TABLE 26B. Capacity and throughput of public and cooperative sector dairy plants in 1986 (Provisional).

'000 litres/day				
Plants	Nos.	Installed capacity	Average throughput	Percentage capacity utilisation
Liquid milk plants	137	9597	7779	81.0
Product factories	39	6345	4407	69.5
Rural/Pilot dairy plants	74	340	252	74.0
Total	250	16282	12438	76.4

Source: Ministry of Agriculture, Government of India.

TABLE 27. Ten largest milk plants in the cooperative and public sectors on the basis of average throughput 1985-86.

Lakh lpd

S.No.	Name of Dairy	Raw milk Procurement capacity	Throughput	
			Peak*	Average
1.	Kaira (Amul)	8.00	8.37	6.12
2.	Mother Dairy, Delhi	6.50	6.30	5.81
3.	Mehsana (Sagar Dairy)	7.50	7.52	5.74
4.	Worli Dairy, Bombay	4.50	4.20	4.00
5.	Mother Dairy Kurla, Bombay	4.00	4.31	3.88
6.	Delhi Milk Scheme, Delhi	3.75	3.32	3.05
7.	Mother Dairy, Calcutta	4.00	3.46	3.29
8.	Sabarkantha (Sabar Dairy)	4.40	3.48	2.86
9.	Aarey (Aarey Milk Colony), Bombay	2.50	2.44	2.33
10.	Bangalore Dairy	3.50	3.78	2.78

*Peak - Average daily throughput during peak flush months.

TABLE 28. Licensed capacity of milk product factories in the private sector.

tonnes											
Name of Factory	Location	Milk Powder	Infant		Condensed Milk	Malted Milk Food	Cheese	Butter	Ghee	Casein	Remarks
			Milk Food								
ANDHRA PRADESH											
H M M Limited	Rajahmundry	—	—	—	—	6,000	—	—	—	—	
HARYANA											
Haryana Milk-foods Ltd	Pehowa	2,000*	—	—	1,000 or 250 SMP/WMP/IMF	—	—	—	600	—	*Includes IMF
KARNATAKA											
Dempo Dairy Industries Limited	Bijapur	1,900*	—	—	—	—	—	—	—	—	*Includes IMF/MMF
MAHARASHTRA											
Cadbury India Limited (Hindustan Cocoa Products Ltd)	Thane, Bombay	—	—	—	—	1,800	—	—	—	—	
Dumex (Pfizer Limited)	Bombay	—	1,320	—	—	—	—	—	—	—	
Raptakos Brett & Co	Thane, Bombay	—	1,250	—	—	—	—	—	—	—	
PUNJAB											
Food Specialities Limited	Moga	—	10,000 [@]	—	6,000	3,000*	—	—	—	—	@Includes milk powder *within the overall production capacity of 16,000 tonnes of IMF & CM.
H M M Limited	Nabha	228	228	—	—	9,600	—	—	204	—	
Jagatjit Industries Limited	Hamira	—	—	—	—	4,800	—	—	—	—	
Milkfood Ltd	Bhadurgarh, Patiala	2,500*	—	—	1,200 or 300 tonnes of MP/IMF	—	500	—	—	—	*Includes IMF

TABLE 28. (Contd.) Licensed capacity of milk products factories in the private sector.

Name of Factory	Location	Milk Powder	Infant Milk Food	Condensed Milk	Malted Milk Food	Cheese	Butter	Ghee	Casein	Remarks
RAJASTHAN										
Dalmia Dairy Industries Ltd	Bharatpur	1,350*	—	—	—	—	—	—	—	*Includes IMF/MMF
UTTAR PRADESH										
Foremost Industries (I) Ltd	Saharanpur	2,400*	—	—	—	—	—	—	—	*Includes 600 tonnes of IMF
Glindia Limited (Glaxo Laboratories)	Aligarh	—	4,000	—	—	—	—	—	—	
Indodan Industries Ltd	Muzaffarnagar	—	—	—	1,080 (single shift)	—	—	—	—	
Lipton India Limited	Etah	2,621*	—	—	—	—	—	—	—	*Includes 1,000 tonnes and 455 tonnes of IMF

Abbreviations: CM: Condensed Milk; IMF: Infant Milk Food; MMF: Malted Milk Food; MP: Milk Powder; SMP: Skimmed Milk Powder; WMP: Whole Milk Powder

TABLE 29. Progress of dairy husbandry activities of the Kaira District Co-operative Milk Producers' Union Ltd (AMUL), Anand.

Financial Year	Dairy co-operative societies (DCS)	Members of societies	Milk collected from societies (kg)	Milk collection centres (owned by societies)	A I centres	Artificial Inseminations	Mobile Vet dispensaries	Cases treated by mobile dispensaries	Sale of feed (in tonnes)	Value of sale (Rs)
1948-49	13	924	1,136,363	—	—	—	—	—	—	790,000
1950-51	33	3,973	5,000,000	—	5	578	—	—	—	3,395,000
1955-56	64	22,828	11,136,363	—	7	3,854	—	—	—	7,486,000
1960-61	195	40,500	23,915,000	—	26	9,077	2	—	—	19,853,000
1965-66	518	110,000	65,905,000	—	261	41,841	4	16,453	—	92,219,207
1970-71	706	180,000	118,225,273	210	523	157,547	7	31,777	15,911	273,941,845
1971-72	744	215,000	133,222,528	266	550	156,823	16	70,078	36,858	336,039,477
1972-73	783	225,000	147,811,128	320	581	157,316	19	74,254	41,974	392,238,718
1973-74	794	235,000	111,948,210	348	571	150,419	21	89,931	51,311	316,178,247
1974-75	844	245,000	130,952,349	372	668	192,626	21	79,886	50,730	446,463,322
1975-76	829	250,000	129,041,218	412	665	207,674	21	96,659	59,868	427,255,597
1976-77	831	255,000	127,017,040	445	678	222,000	23	118,258	46,269	442,001,799
1977-78	831	275,000	141,197,710	460	711	248,263	21	159,219	63,950	535,529,349
1978-79	856	295,000	159,262,615	495	734	255,011	21	135,041	77,775	581,133,173
1979-80	895	308,000	169,376,542	509	739	268,792	22	136,081	82,540	664,242,138
1980-81	895	327,000	169,576,969	521	735	285,073	23	133,695	82,331	752,997,024
1981-82	894	339,000	160,018,395	527	731	325,886	23	145,199	99,350	785,665,255
1982-83	895	352,000	183,820,076	537	704	353,152	18	124,198	98,056	953,607,757
1983-84	880	359,000	182,022,754	558	722	354,744	18	123,043	110,819	1,030,481,506
1984-85	870	359,000	193,220,249	584	736	422,876	18	143,080	131,744	1,224,795,663
1985-86	872	365,000	227,261,712	606	759	497,174	18	183,614	152,651	1,334,192,316

Source: Annual Reports of Kaira District Co-operative Milk Producers' Union Ltd, Anand.

TABLE 30. Consumer prices of milk of the Greater Bombay Milk Scheme (GBMS) from April 1947 to March 1987.

Period	Price
Whole Milk (6 per cent fat, 9 per cent SNF)	
01.04.47 to 31.03.57	14 annas/seer*
01.04.57 to 02.06.59	88 paise/seer*
03.06.59 to 09.04.62	96 paise/seer*
10.04.62 to 30.11.65	Rs 1.04/litre
01.12.65 to 23.04.67	Rs 1.30/litre
24.04.67 to 05.01.73	Rs 1.70/litre
06.01.73 to 06.10.76	discontinued
07.10.76 to 25.01.77 (loose)	Rs 3.00/litre
26.01.77 to 14.05.77 (bottled)	Rs 3.00/litre
15.05.77 to 31.01.81	Rs 3.20/litre
01.02.81 to 31.07.81	Rs 4.30/litre
01.08.81 to 26.04.83	Rs 5.00/litre
27.04.83 onwards	Rs 6.00/litre
Standardized Milk (4.5 per cent fat, 8.5 per cent SNF)	
06.01.73 to 14.04.74	Rs 1.70/litre
15.04.74 to 31.01.81	Rs 2.60/litre
01.02.81 to 31.07.81	Rs 2.90/litre
01.08.81 to 26.04.83	Rs 3.30/litre
27.04.83 onwards	Rs 4.30/litre
Toned Milk (3 per cent fat, 8.5 per cent SNF)	
01.04.47 to 05.12.54	8 annas/seer*
06.12.54 to 31.03.57	6 annas/seer*
01.04.57 to 02.06.60	48 paise/seer*
03.06.60 to 09.04.62	54 paise/seer*
10.04.62 to 30.11.65	60 paise/litre
01.12.65 to 21.12.72	90 paise/litre
22.12.72 onwards	discontinued
Double Toned Milk (1.5 per cent fat, 9 per cent SNF)	
25.09.78 to 26.04.83	Rs 2.10/litre
27.04.83 onwards	Rs 2.60/litre
Subsidized (3 per cent butter fat milk)	
15.04.74 to 15.02.77	Rs 1.80/litre
16.02.77 onwards	discontinued

*Approximately equal to one litre.
Source: Greater Bombay Milk Scheme.

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TABLE 31. Trends in the World Milk Production Continentwise and in selected countries.

million tonnes

Continent/Country	Milk	1974-76	1979-81	1984	1985
<u>AFRICA</u> (Total)	Cow Milk	9.0	10.5	11.7	11.7
	Buff Milk	1.2	1.2	1.3	1.4
	Total	10.2	11.7	13.0	13.1
Egypt	Cow Milk	-	0.6	1.0	1.0
	Buff Milk	1.2	1.2	1.3	1.4
	Total	1.2	1.8	2.3	2.4
Kenya	Cow Milk	0.9	0.9	1.1	1.1
	Buff Milk	-	-	-	-
	Total	0.9	0.9	1.1	1.1
South Africa	Cow Milk	2.5	2.6	2.6	2.6
	Buff Milk	-	-	-	-
	Total	2.5	2.6	2.6	2.6
Sudan	Cow Milk	0.84	1.3	1.8	1.7
	Buff Milk	-	-	-	-
	Total	0.84	1.3	1.8	1.7
<u>AMERICA</u> (Total) NORTH & CENTRAL	Cow Milk	68.3	76.5	80.7	83.6
	Buff Milk	-	-	-	-
	Total	68.3	76.5	80.7	83.6 ✓
Canada	Cow Milk	7.7	7.8	8.2	8.2
	Buff Milk	-	-	-	-
	Total	7.7	7.8	8.2	8.2
Mexico	Cow Milk	4.9	7.0	7.2	6.9
	Buff Milk	-	-	-	-
	Total	4.9	7.0	7.2	6.9
USA	Cow Milk	53.1	58.2	61.7	65.0 ✓
	Buff Milk	-	-	-	-
	Total	53.1	58.2	61.7	65.0
<u>AMERICA</u> (Total) SOUTH	Cow Milk	22.3	23.9	23.3	24.6
	Buff Milk	-	-	-	-
	Total	22.3	23.9	23.3	24.6
Argentina	Cow Milk	5.6	5.3	5.2	5.6
	Buff Milk	-	-	-	-
	Total	5.6	5.3	5.2	5.6
Brazil	Cow Milk	9.9	11.2	10.1	10.7
	Buff Milk	-	-	-	-
	Total	9.9	11.2	10.1	10.7

TABLE 31. (Contd) Trends in the World Milk Production Continentwise and in selected countries.

million tonnes

Continent/Country	Milk	1974-76	1979-81	1984	1985
<u>ASIA</u> (Total)	Cow Milk	27.0	33.0	39.5	42.4
	Buff Milk	22.2	26.1	30.0	31.1
	Total	49.2	59.1	69.5	73.5 ✓
China	Cow Milk	0.09	1.2	2.3	2.6
	Buff Milk	1.2	1.4	1.6	1.6
	Total	1.29	2.6	3.9	4.2
India	Cow Milk	10.9	13.2	17.1	18.5
	Buff Milk	14.3	17.3	20.4	21.3
	Total	25.2	30.5	37.5	39.8 ✓
Japan	Cow Milk	5.0	6.5	7.1	7.4
	Buff Milk	-	-	-	-
	Total	5.0	6.5	7.1	7.4
Pakistan	Cow Milk	2.2	2.2	2.4	2.4
	Buff Milk	5.7	6.4	7.0	7.1
	Total	7.9	8.6	9.4	9.5
<u>EUROPE</u> (Total)	Cow Milk	160.6	176.2	186.3	183.8
	Buff Milk	.009	.009	.009	.009
	Total	160.609	176.209	186.309	183.809
Denmark	Cow Milk	5.0	5.1	5.2	5.1
	Buff Milk	-	-	-	-
	Total	5.0	5.1	5.2	5.1
France	Cow Milk	29.6	32.1	33.9	33.0
	Buff Milk	-	-	-	-
	Total	29.6	32.1	33.9	33.0 ✓
Germany (East)	Cow Milk	8.1	8.2	8.7	8.9
	Buff Milk	-	-	-	-
	Total	8.1	8.2	8.7	8.9
Germany (West)	Cow Milk	21.8	24.5	26.2	25.7 ✓
	Buff Milk	-	-	-	-
	Total	21.8	24.5	26.2	25.7
Italy	Cow Milk	9.5	10.5	10.9	11.0
	Buff Milk	.006	.006	.006	.005
	Total	9.506	10.506	10.906	11.005
Netherlands	Cow Milk	10.2	11.8	12.8	12.6
	Buff Milk	-	-	-	-
	Total	10.2	11.8	12.8	12.6
Poland	Cow Milk	16.5	16.3	16.7	16.3
	Buff Milk	-	-	-	-
	Total	16.5	16.3	16.7	16.3

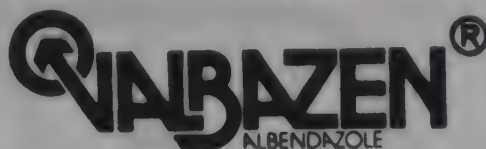
TABLE 31. (Contd) Trends in the World Milk Production Continentwise and in selected countries.

million tonnes

Continent/Country	Milk	1974-76	1979-81	1984	1985
EUROPE (Contd)					
UK	Cow Milk	14.1	15.9	16.2	16.3
	Buff Milk	-	-	-	-
	Total	14.1	15.9	16.2	16.3
OCEANIA (Total)					
	Cow Milk	12.9	12.2	13.8	14.2
	Buff Milk	-	-	-	-
	Total	12.9	12.2	13.8	14.2
Australia	Cow Milk	6.7	5.6	6.1	6.2
	Buff Milk	-	-	-	-
	Total	6.7	5.6	6.1	6.2
New Zealand	Cow Milk	6.1	6.6	7.7	7.9
	Buff Milk	-	-	-	-
	Total	6.1	6.6	7.7	7.9
USSR					
	Cow Milk	90.1	90.6	97.5	97.8
	Buff Milk	-	-	-	-
	Total	90.1	90.6	97.5	97.8
DEVELOPED COUNTRIES (ALL)					
	Cow Milk	332.4	354.8	378.0	379.7
	Buff Milk	.009	.009	.009	.008
	Total	332.409	354.809	378.009	379.708
DEVELOPING COUNTRIES (ALL)					
	Cow Milk	58.4	68.3	74.8	78.3
	Buff Milk	23.3	27.4	31.3	32.4
	Total	81.7	95.7	106.1	110.7
WORLD (TOTAL)					
	Cow Milk	390.8	423.0	453.0	458.1
	Buff Milk	23.4	27.5	31.4	32.5
	Total	414.2	450.5	484.4	490.6

Source: FAO Production Yearbook 1985.

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Management Guide

This chapter highlights the more important points of scientific management techniques. The aim is to bring to attention those factors that may be overlooked and not to provide information on all and every aspect of dairy management/production.

For all practical purposes, the farmer regards his dairy cow/animal as a machine to produce milk. His input is mainly feed and management care and the output is milk. Although the female calves born can be an important source of income as well as provide replacement for his cows, that need to be culled. His profits come by maximising the output and the returns from it and by minimising the costs of his inputs. Notwithstanding the genetic ability of the dairy cattle and the nutritive value of the feed, the invisible factor that makes a significant difference to the profitability of dairy farming is the farmer and the management skill he brings to bear on his operations.

Select the best of the buffaloes/crossbred/high producing descript cows. Feed them with the best of feeds and fodders preferably a mixture of cultivated leguminous and nonleguminous fodder. Protect against common diseases. Yet, the milk-yield will vary widely — from high to low. The result can be profit... or loss. The critical factor that makes all the difference is management.

Scientific dairy management helps the farmer to channelise his limited resources to maximise returns from his dairy farm. The cost of feed and of a good dairy animal as well as milk prices are generally outside his control, but the volume of milk production depends largely on the application of sound management practices — or lack thereof.

Experiments have shown that a crossbred cow/buffalo can yield, on an average, 25 per cent more milk as a result of better feeding and management. The single biggest factor in the production cost of milk is the feed, constituting on an average 60-70 per cent of the total cost of milk.

For a dairy cattle to yield milk in economic quantities, it must be fed with nutritionally-balanced feed — with requisite quantity of energy (carbohydrates), proteins, vitamins and minerals and fresh, clean water to provide the requisite food elements to the cow required in the process of her synthesising milk. The daily water requirements range from 50 to 120 litres, depending upon the milk yield. For each litre of milk produced the cow may need as much as four litres of water for drinking. Interestingly, a cow giving 20 kg of milk per day will not require twice the amount of feed as required by a similar cow giving daily milk yield of 10 kg, primarily because of lower maintenance requirement of one high producing cow compared to the two low producing ones.

The production performance of a dairy animal can be viewed from another point of view: a good quality crossbred cow/buffalo having a bodyweight of 350-450 kg yields in a year about 2,500 to 3,000 kg of milk — nearly six to eight times its own weight. To coax a cow to tap its potential, the farmer must give due care to feed his animal suitably so that nutrients that are passed out of its body in the milk are fully replenished and there is some margin to meet the requirements of reproduction. Hence, the utmost care to feeding.

For profitable dairying the farmer must get a minimum of 2,000 kg of milk per animal per year. So, the farmer must select his animals, going by their quality and not their cost. He must evaluate its production (milk-yield ability) and reproduction (breeding efficiency) potentials: long lactation period, short inter-calving period and high milk yield per day. It is not commonly appreciated that the low-yielders require as much care, labour and inputs as the high-yielders. So, purchase of low-yielding cow is not a reliable method of reducing the cost of dairying.

Normally, under good management conditions, a farmer and his family can look after at least three cows/buffaloes and their calves. For bigger units, say of ten animals and more, an additional full time worker is required to look after their feeding and management. For additional hired worker, a detailed programme of daily duties is desirable.

Efficient day-to-day management of farm and effective marketing of milk are the main responsibilities of the dairy farmer, and when properly carried out will make his operation productive and profitable. Repetitive task must be routinized: cleaning the shed with disinfectants, spraying with insecticides, grooming and brushing the animals with currycomb, milking them, filling the manger with chaffed fodder and filling watering tank with clean and cool water, feeding the calves, chaffing the fodder, cleaning the utensils and towels. Other periodical operations include vaccination, deworming of the calves, testing of cows for non-clinical mastitis using black plate; if there are any flocculations in milk, it will be indicative of mastitis.

Although adult cattle begins to yield milk after first calving at the age of 30-40 months when it attains a body-weight of 250-350 kg, but the foundation for milk-yield is laid from the day when it is born. Any setback early in its life — low weight at birth (normal weight will be low in each crossbreds, 25-30 kg), improper housing, feeding and management — will permanently damage its milk-yielding capacity. Poor care and management of calves can cause mortality as high as 20-25 per cent in the first three months. After regular calving, the lactation length, on an average, is 305 days, and the daily milk yield reaches its peak within two months,

persists for another 2-3 months and then begins to decline. Normally, a milch animal is capable of giving, on an average, eight lactations. For getting higher profits from dairy farm operations, it is better to raise a female calf to maturity rather than purchase an adult cow/buffalo. Contrary to the popular notion, crossbred male calves make good bullocks. In bigger dairy unit, culling and replacement recommended is 10 to 15 per cent per annum. In a well-managed unit, it must be assured that 60 per cent of cows should calve each year and around 80 per cent must be in milk all the time.

To get the maximum price for the milk produced, the farmer must take adequate steps for ensuring that milk retains its purity, wholesomeness and nutritive value for maximum shelf life. By its very nature, milk is perishable and, if not stored cleanly, tends to turn sour and lose its commercial value. Milking should be done in a clean place using clean milking pails and arrangement should be made to cool and transport it to the nearest collection centre/dairy plant. The milk should be kept at low temperature, preferably around 10°C. The price that a farmer gets for his produce depends upon the quality of milk and so he must take all steps to preserve the milk quality. In this task, he can be a member of a local milk producers cooperative society which keeps a proper record of quantity and quality of milk received and makes daily payment. In turn, it sends the milk collected to the nearest dairy plant for further processing and distribution as fluid milk and milk products.

For successful operation of a dairy plant, a proper maintenance of plant machinery is vital. The bulk of the plant consists of expensive stainless steel vessels such as chilling tank, pasteurization plant and other dairy utensils. Their cost is indeed high, but conditions under which they have to operate are not conducive to longevity. They are in almost daily use in an atmosphere of dampness where water, steam, acids, alkaline cleaners, chlorine solutions abound. Anything which can be done to increase their life expectancy would more than pay its way.

The plant manager must take steps to minimise bottle losses, steam losses, fat losses and SNF losses. A series of quality control and platform tests in different stages of milk processing ensures that the

final product reaches the consumer in a wholesome state. To ensure smooth operation of various dairy units, a proper maintenance schedule for different equipment must be rigidly followed. For this, fast-wearing spare-parts for certain key equipments must be stocked to take care of emergency breakdowns in pasteurizers, cream separators, bottling plants, receiving tanks, homogenizers. These and similar details will assure the trouble-free performance of the plant and fulfil its objective of providing inexpensive and safe milk and its products to the consumer. Special characteristics of milk processing include the following:

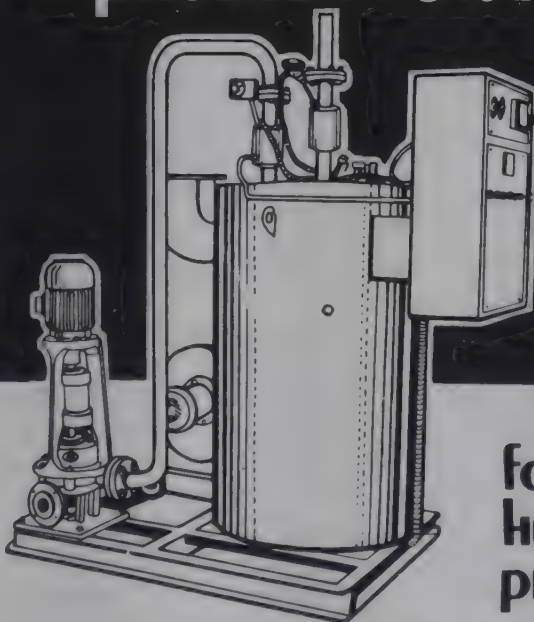
- Perishable nature of the product and its short shelf-life;
- Innumerable and widely scattered

collection centres;

- A large number of distribution points;
- A scattered installation of dissimilar capacities;
- Fluctuating loads due to the existence of lean and flush seasons;
- A high degree of hygiene requirements;
- Public utility with uncompromising accountability; and,
- Varying quality of raw milk.

By paying adequate attention to management, the performance and productivity of dairying at all stages from the producer to the consumer will be achieved in the quest for attaining optimum returns on investment as well as socio-economic objective of helping the rural poor cross the poverty line. ■

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Economic & Technical Feasibility of Dairy Farming

Editor's Note: A guideline to help a farmer/extension worker in assessing the economic and technical feasibility of a dairy unit is given below. Various management pointers, including breeding and feeding.

In assessing the economic and technical feasibility of a dairy farm project, the suitability or availability of the following should be looked into:

Location: The farm should be located on a high, well-drained land, near all-weather, pucca road leading to milk market or collection centre.

Water of good quality and in sufficient quantity should be available.

Electricity should be available.

Livestock: Cows/buffaloes with a minimum lactation of 2,000 litres, low maturity age, and short inter-calving period should form the foundation stock.

Breeding facilities, preferably AI, should be available at hand.

Cultivable land: Sufficient land for fodder production throughout the year.

Health cover: Suitable arrangements for providing health cover to animals.

Market: Assured market for milk and surplus progeny.

Economic Aspects

For increasing the productivity and profitability in dairying, certain aspects must be kept in view, irrespective of the fact whether the dairy unit is set up as a source of supplementary income with two-three animals or a commercial unit with a herd of six to ten animals or more. The

largest item of expenditure is milk production. To reduce his cost by producing both concentrate and fodder (e.g., hay) should be purchased and stored during season.

The addition of concentrate to the daily ration reduces the feeding cost while improving the production. The home-grown fodder per. The green fodder during lactation period, can be used for meeting the requirements. The legume fodder, should, when included in the ration, reduce the concentrate in feed, kept in view and per their availability.

Disease control: The herd should be kept in good health. The scheduled worming should be regularly sub for diagnosing such as mastitis, brucella. Milking: Full udder rather than throw to give higher per

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3-10 adult stock
5 calves.

Standards

Standards to be

der may range from 2-6 kg per animal per day.

Concentrates: If green fodder is available ad lib, then the concentrate feeding can be avoided upto milk production of 6-7 kg per day; over and above this for every 2 kg of milk of buffaloes and 3 kg of milk of cows, 1 kg of concentrate is required.

Housing: Non-slippery floor and inexpensive shed, preferably brick flooring (avoid cement flooring) with slope for easy cleaning; well-ventilated shed with simple roofing (thatched in villages) and with manger and adequate drainage.

Milking: Two to three times a day at fixed time and in one sitting within eight minutes.

Milk for calf: Leave milk according to the requirement for calf after milking, if it is not weaned at birth. ■

Development Wreck

What happens if a technology or a whole system of technologies is transferred from a surrounding with a high technological culture into a surrounding with a low technological culture? Most probably, the exercise will end in failure and lead to another "development-wreck".

There is a country in Africa that printed on one of its current banknotes a picture showing school children drinking pasteurized milk from one-way packages, symbolizing a recent achievement of the country -- the school milk programme. After some time, it was found that the milk packaging used in that programme did cost more than the milk inside. Furthermore, it proved to be difficult to distribute pasteurized milk in a tropical country where no reliable cooling facilities exist. To set up and

Preparation of Project Report

IT has been observed that a proposal for setting up new dairy units/expansion of the existing units/enhancement of cash limits, submitted by an individual or group of individuals does not meet the requirements of the financial institutions. At times, the project submitted provides all the required technical information, but the presentation of the project report may be such that it might confuse the banker or may not contain the required economic appraisal, resulting in delay or even rejection. On the other hand, some farmers/entrepreneurs who are shrewd in their approach, like to get their project over-financed, or divert bank credit. Both over-financing and under-financing are detrimental to the growth of a unit. Optimum and timely credit are the two corner-stones of success in any enterprise.

While scrutinising the loan application for sanction, the banks are required to consider the following:

- Whether the scheme is technically feasible;
- Whether borrower will have adequate incremental income, i.e., is a scheme economically viable; and,
- Whether the expenditure envisaged under the scheme is reasonable.

In order, therefore, to cut short the delay and provide optimum finance, an attempt has been made here to provide guidelines for preparing a project report which would help give a reasonable amount of information to the credit institution, so that the proposal is processed within the minimum possible time. Information in it should be presented under the following headings:

Introduction: The project report should have a brief introduction about the potential of the area vis-a-vis local demand for milk/dairy products, infrastructural facilities, marketing centres and their accessibility.

Objectives: Under this head, the applicant should specifically mention about the purpose (Production/Processing), and size of the unit, phasing, if any, and whether the

unit is meant for supplementing income or as a main occupation for self-employment.

Entrepreneur: Name (s) of borrower (s), their experience in the proposed enterprise, and financial position be given. If it is a partnership firm or company, names of directors and their financial worth, share capital, bye-laws and memoranda of articles of association be given.

Location: Mention clearly the specific site and its total area, distance from the nearest town where major inputs are available and also distance from the bank's branch from where the applicant intends to avail of loan. Availability of water, electricity and all-weather road near the unit be indicated.

Housing: Indicate the floor space required for each item of civil works wherever possible; give map drawings and estimates. Justify the need for provision of such items and their respective size. Provision of items like water facilities (well, pumpset, overhead tank, pipeline), electricity facilities (generator, etc), equipment, office, store, laboratory, staff quarters, boundary wall or fencing, etc, should be indicated. Depending upon the situation, total floor area for shed should be worked out and cost per sq ft (sq m) be indicated.

Equipment: The equipment requirement will vary depending upon the size and type of activity. It is desirable to give the list of equipment to be purchased along with their approximate number and price. Enclose quotations for major equipment.

Management: In case of small to medium-sized units, the appointment of a qualified manager may not be an economically viable proposition. Some practical experience/training in the line by the borrower is essential.

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Medium-sized units should not be allowed to be operated by a third person. The applicant himself or his family members should work along with the labour. The management of an enterprise can be broadly divided into three parts, viz., production management, marketing management and financial management.

- **Production Management:** Production management includes timely planning, procurement of inputs and equipment, optimum use of labour, maintenance of neat and clean premises etc.
- **Marketing Management:** Marketing the produce should be so arranged that the borrower gets a reasonably good price as prevailing in the market. For this purpose, one has to be vigilant about the market fluctuations and try to tap the area which is unexploited/under-exploited. The knowledge of various marketing techniques and ability to market the produce with minimum overhead charges are the prerequisites of any successful entrepreneur. He should know the scientific methods of processing, storage, preservation and transport.
- **Financial Management:** It is needed at the following two stages:
 - i. When the unit gets financial assistance from the credit institution; and,
 - ii. When the unit starts generating income.

In the first case, the borrower as well as the financing bank can play a significant role in the proper use for maximizing gains. Any misutilization of funds at this stage may hamper the growth of a unit. In such units, where government subsidy is available, the necessary advance action to get the subsidy released should be made. To avoid misutilization of loan, it is desirable for the bank to release the loan in stages for sheds, equipment, and miscellaneous items of expenses required. As far as possible, loans be given against bills submitted to banks from concerned parties supplying the inputs. This helps to have an overall control and more effective use of loan.

The best way to keep the unit running successfully even during a crisis is routing the entire sale proceeds through the bank.

It is also necessary that the entrepreneur keeps a correct record of all inputs costs (non-recurring and recurring), and income. For this purpose, banks have designed simple proformas which should be explained by banker to the borrower while releasing the loan. Periodical inspection of such records by banker is necessary. This will automatically help improve financial management of the unit.

Marketing: The entrepreneur should indicate whether he has any specific marketing arrangements such as:

1. Annual contracts with any organisation/department/hotels, etc;
2. Selling the produce in the wholesale market;
3. Relying upon traders who procure the produce from his unit;
4. Retail market, if any, and the percentage of sale on this account;
5. Any other marketing arrangements.

Price and Production Norms: As the price of the produce at any one season or month will be deceptive, the average selling price should be indicated. While making projections for four/five years, the entrepreneur may, however, consider some percentage of increase in the prices based on the trend during the average production expected from the unit (average production per year).

Investment: On the basis of the size of the unit and the cost of various materials/items of expenditure, work out the total investment of the following heads:

Fixed capital:

- **Land:** Area, cost per hectare, total cost (This is borrower's contribution and is not eligible for bank loan).
- **Land Development:** Roads, land-shaping, fencing, etc.
- **Civil Works:** Sheds, godowns, quarters, office, etc.
- **Equipment:** Production/Processing/farming.
- **Miscellaneous:** (i) Water/electricity facility; (ii) Transport, etc.

Margin: Indicate as to how much of the total investment required for establishing the project would be borne by the applicant from his own resources. Generally, he would be required to meet 25 per cent of the total investment.

Sanction of loan: The total investment minus margin would give the long-term loan assistance required. In addition to this, short-term loan (cash credit), as explained earlier, can be sanctioned.

Loan Repayment Schedule: Prepare a repayment schedule, giving the details of income, expenditure and gross surplus for every year. The net surplus is worked out after deducting the loan instalments and interest on long-term loan to be paid back to the bank from the gross surplus. The statement should be for a period equal to the period within which the loan and interest will be paid back.

Security: The norms of security vary from bank to bank, but the viability of the project and the repaying capacity of the beneficiary is more important than security.

Income: A financial statement, taking into account the loan amount, needs to be presented on the lines given below:

<u>Expenditure</u>	<u>Income</u>
1. Expenditure for inputs during the year.	1. Sale of produce.
2. Expenditure on replacement, if any.	2. Sale of other byproducts.
3. Interest on short-term loan amount.	
4. Insurance charges.	
5. Repairs & maintenance.	
6. Unforeseen expenditure.	

Total: Expenditure: _____ Income: _____

Gross Surplus = Total income — total expenditure.

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Financing Dairy Farming

Dr M.V. RAO
Rural Development Officer, State Bank of India, New Delhi

The comparative economics of two-/ten-animal dairy unit, having buffaloes/crossbred cows, are given below. While using the guidelines due consideration should be given to the fact that prices differ from place to place and fluctuate from season to season. The prices change under the impact of prevailing economic conditions. The costs shown below are average costs and may not be valid for any particular place. For a realistic guidance at any given place, the local prices of various inputs should be ascertained and the economics worked out.

FARMERS, who keep dairy animals, generally belong to the category of small/marginal farmers and landless labourers. They normally keep one/two milch animals as a subsidairy occupation to supplement their income. But to establish, dairy farming as a viable economic unit as a full time occupation a minimum of 8 to 10 high-yielding milch animals are necessary and preferably one hectare of cultivable land to grow fodder crops for feeding the animals. Studies carried out at the National Dairy Research Institute, indicate that a dairy animal to be economical must have a lactational yield between 1800-2000 kg. Further, a capital expenditure of about Rs 70,000 to Rs 90,000 is needed for the purchase of animals, construction of cattleshed and initial capital for turnover and the like. It does not, however, include the cost of land.

Income from dairy farming depends upon various factors. For increasing the productivity and profitability in dairy farming, attention needs to be paid to the following:

- Capital investment: It varies with the quality of animals purchased, type of construction etc.

- Location: Nearness of the farm to the market and approach through pucca road.
- Managerial skill of the farmer/his family members.
- Veterinary aid and breeding facilities: Adequate and timely availability of these facilities.
- Choice of dairy animal is crucial to the economic dairy both in terms of milk production and reproductive efficiency, especially calving interval. It should have high daily milk production. It should have short dry-period, optimal lactation length.
- Replacement of livestock is more economic by raising heifers on the farm than purchasing adult cow/buffalo in milk.
- AI facilities in the neighbourhood to ensure timely breeding; in their absence, the arrangement of superior bull for natural service.
- Feeding of balanced rations.
- Cultivation of green fodder on the farmer's land.
- Mode of marketing will influence the net profit, and so proper arrangements need to be made in advance.

Attention needs to be paid to the following norms to be observed in the planning of a dairy farm project:

- Floor space of cattle shed: About two sq meters per animal with 4.5 sq metres as loafing area.

- Shed construction cost: For small units located in rural areas Rs 600 per animal; for medium sized unit near urban areas Rs 1,000 to 1,200 per animal.

- Land requirement: One hectare of cultivable land for fodder requirement of 8-10 animals.

- Labour requirement: For small units, self employed/assisted by family members. For a big farm one worker for 8-10 animals.

- Price of milch animals: Rs 4,500 to Rs 6,000; high yielders may cost more, up to Rs 8,000. Preferred dairy animal is buffalo (Murrah/graded Murrah/Nili-Ravi) or cross-bred cow.

- The milch animal: In second lactation and in the first month of lactation, having a female calf at its heel.

- Replacement of milch animals: After 6-7 lactations.

- Mortality: 2-3 per cent for adult animals; calf mortality 15-20 per cent.

- Cost of green fodder: Rs 15 per quintal (home grown may be cheaper).

- Cost of dry fodder (bhusa): From Rs 40 to Rs 50 per quintal.

- Cost of concentrate: Rs 175 per quintal.

- Cost of vaccination and medication: Rs 100 per animal per year.

- Lactation period: Varies from 280 to 305 days, depending upon the dairy animal (crossbred cow/buffalo), followed by dry period of 90 to 140 days.

- Milk yield per day: 7 to 10 kg.

- Milk price: Rs 2.50 to Rs 3.50 per kg depending on fat percentage and season.

- Value of manure: Rs 200 per animal per annum.

- Depreciation of shed: 5 per cent of the cost of construction. It is not taken into account during the loan period, serving towards loan repayment installments.

- Insurance charges: 4 per cent of the purchase price of the animal.

- Interest rate: Taken at 12.5 per cent, applicable to bank loans under priority sector.

Prevent fire.

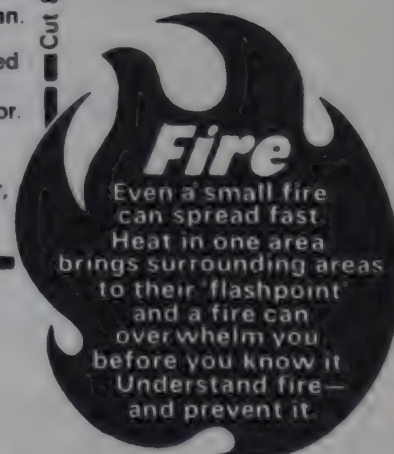
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FINANCIAL STATEMENT FOR SETTING UP A TWO-ANIMAL (BUFFALO/CROSSBRED COW) DAIRY UNIT

A two-animal dairy unit could be taken up by weaker sections in rural areas as a subsidiary occupation to supplement their income. Weaker sections are entitled to subsidy, ranging between 25 to 33.3 per cent depending upon eligibility under various Government-sponsored programmes like the Integrated Rural Development Projects (IRDPs) and Special Livestock Production Programmes (SLPPs) and the like. The economics of such a unit has been worked out on the following assumptions:

- For the purpose of calculations, year has been taken as 360 days duration.
- The cost of milch buffalo has been taken at Rs 4,500 and of a crossbred cow at Rs 6,000 including the cost of transportation, if any.
- The milch animals will be purchased during their 2nd lactation and in 1st month of lactation period.
- The second animal will be purchased 6 months after the purchase of first animal.
- Average lactation period has been taken as 280 days in case of buffaloes and 300 days in case of crossbred animals followed by a dry period of 140 days in buffaloes and 100 days in crossbred cows.
- The lactation period of the milch animals during the 1st year of their purchase will be one month short of the stipulated length as they would be purchased in the 1st month of lactation.
- The average milk yield per day has been taken as 7 litres in case of buffaloes and 8 litres in case of crossbred cows.
- The average price of milk per litre has been taken as Rs 3.25 for buffalo milk and Rs 2.75 for cow milk.
- The milch animals will be fed with green fodder, dry fodder and concentrates during lactation and dry periods. The amount of concentrate could be reduced during the dry period.
- The cost per quintal of green fodder, dry fodder and concentrates has been taken at Rs 15/-, Rs 40/- and Rs 175/- respectively.
- No labour cost has been taken into account as no wages are paid. The farmer and his family members maintain the small unit.
- Income from sale of calves has not been taken into account as it compensates their rearing cost.
- A concessional rate of interest of 10 per cent is charged from those borrowers who are under poverty line and eligible under the Integrated Rural Development Projects (IRDP) and other special programmes. A differential rate of interest of only 4 per cent is charged for those beneficiaries eligible under weaker sections programme: Annual income of less than Rs 2,000 and Rs 3,000 in rural and urban areas.

CAPITAL INVESTMENT

	<u>Buffalo Unit</u>	<u>Crossbred Unit</u>
Cost of two milch animals	Rs 9,000	Rs 12,000
Cost of shed	Rs 1,200	Rs 1,200
Cost of equipment	Rs 100	Rs 100
	Rs 10,300	Rs 13,300

Note: For small units which are set up generally to supplement the income, provision for construction of shed and equipment may not be essential as most of the farmers have adequate arrangements for maintaining milch animals.

On the basis of the assumptions given above, yearwise costs and benefits are worked out as follows:

FEED AND FODDER REQUIREMENTS PER DAY

	Rate per kg Rs	In Milk				Dry			
		kg	Buff Cost Rs	kg	CBC Cost Rs	kg	Buff Cost Rs	kg	CBC Cost Rs
Green fodder	0.15	20	3.00	25	3.75	10	1.50	15	2.25
Dry fodder	0.40	6	2.40	3	1.20	8	3.20	5	2.00
Concentrates	1.75	3	5.25	3	5.25	1	1.75	1	1.75
			10.65		10.20		6.45		6.00

DAYS IN MILK

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
1st animal	250	270	280	300	270	300	220	270	220	260
2nd animal	180	180	220	260	220	260	220	260	250	260
Total	430	450	500	560	490	560	440	530	470	520

DAYS WHEN DRY

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
1st animal	110	90	80	60	90	60	140	90	140	100
2nd animal	-	-	140	100	140	100	140	100	110	100
Total	110	90	220	160	230	160	280	190	250	200

OPERATIONAL/RECURRING EXPENDITURE (in Rs)

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
During LP	4579	4590	5325	5712	5218	5712	4686	5406	5005	5304
During DP	709	540	1419	960	1483	960	1806	1140	1612	1200
Insurance	360	480	360	480	360	480	360	480	360	480
Veterinary Aid	150	150	200	200	200	200	200	200	200	200
Total	5798	5760	7304	7352	7261	7352	7052	7226	7177	7184

LP: Lactation Period

DP: Dry Period

INCOME (SALE PROCEEDS) (in Rs)

	1st year		2nd year		3rd year		4th year		5th year	
	<u>Buff</u>	<u>CBC</u>	<u>Buff</u>	<u>CBC</u>	<u>Buff</u>	<u>CBC</u>	<u>Buff</u>	<u>CBC</u>	<u>Buff</u>	<u>CBC</u>
Sale of Milk	9783	9900	11375	12320	11148	12320	10010	11660	10693	11440
Manure	300	300	400	400	400	400	400	400	400	400
Total	10083	10200	11775	12720	11548	12720	10410	12060	11093	11840

PROFIT (in Rs)

Income	10083	10200	11775	12720	11548	12720	10410	12060	11093	11840
Expenditure	5798	5760	7304	7352	7261	7352	7052	7226	7177	7184
Profit for two animals	4285	4440	4471	5368	4287	5368	3358	4834	3916	4656
Profit per animal	2142	2220	2235	2684	2143	2684	1679	2417	1958	2328
Profit per month per animal	178	185	186	223	178	223	139	201	163	194

REPAYMENT OF LOAN: Assuming an average loan amount of Rs 8,000 in case of buffalo unit and Rs 10,000 in case of crossbred cow unit, the repayment schedule has been worked out and is given below separately for buffalo and crossbred units respectively.

BUFFALO UNIT

Loan Amount : Rs 8,000
Interest (Average): 12.5% per annum

Year	Profit Rs	Instalment Rs	Interest Rs	Rs	Surplus Rs
1st year	4285	1600	900	(2500)	1785
2nd year	4471	1600	700	(2300)	2171
3rd year	4287	1600	500	(2100)	2187
4th year	3358	1600	300	(1900)	1458
5th year	3916	1600	100	(1700)	2216
Total	20317	8000	2500	(10500)	9817

CROSSBRED COW UNIT

Loan Amount : Rs 10,000
Interest (Average): 12.5% per annum

1st year	4440	2000	1125	(3125)	1315
2nd year	5368	2000	875	(2875)	2493
3rd year	5368	2000	625	(2625)	2743
4th year	4834	2000	375	(2375)	2459
5th year	4656	2000	125	(2125)	2531
Total	24666	10000	3125	(13125)	11541

FINANCIAL STATEMENT FOR SETTING UP A TEN-ANIMAL DAIRY UNIT

A ten-animal dairy unit can be taken up by the educated unemployed, living near a town. Bank loans are provided to assist in setting up these units under the scheme for the educated self-employed. The application for the bank loan should be accompanied by a project report, detailing the technical and economic feasibility of the proposed unit. The economics of the ten-animal dairy unit has been worked out on the following assumptions:

- The unit is managed by a self-employed person with the help of one labourer.
- The unit will be located near a town/city where marketing of milk is assured.
- The cost of the milch buffalo has been taken at Rs 5,000 and of a crossbred cow at Rs 7,000. This includes the cost of transportation, if any.
- Milch animals will be purchased in 2 lots of 6 and 4 at an interval of 6 months.
- At the time of purchase as also during the period of rearing, the probability of producing males and females is taken at 50:50.
- Average lactation period of 300 days both for the buffalo and the cow followed by a dry period of 120 days for the buffalo and 90 days for the crossbred cow.
- The average milk yield per day has been taken as 8 litres for buffaloes and 9.5 litres for crossbred cows.
- Average price per litre of milk has been taken at Rs 4.25 for buffalo milk and Rs 3.80 for cow milk.
- The cost per quintal of green fodder, dry fodder and concentrate has been taken at Rs 15, Rs 50 and Rs 175 per quintal respectively.
- The cost of rearing a female calf has been taken at Rs 500 in the first year and Rs 1,000 in subsequent years in case of buffaloes and Rs 800 in the first year and Rs 1,500 on the subsequent years, for crossbred till 1st calving. The appreciative value of the calves will be more than the expenditure incurred on their rearing.
- Appreciative value of reared female calves has not been included, but they add to the stability of the enterprise. The farm bred heifers help in culling animals whose production is below average.
- A provision of 10 per cent of the purchase price of animals has been made for replacement of those animals who become difficult breeders and for those whose production, on account of some unforeseen situation, goes down and have to be removed.
- Male calves produced on the farm or brought during the course of purchase will be disposed off and the expenditure incurred in rearing the male calves will be covered by the sale proceeds.
- The calf mortality has been taken at 20 per cent during the first year and no mortality during the remaining period. The heifers can be bred for the production of milk.

CAPITAL INVESTMENT

	<u>Buffalo Unit</u> Rs	<u>Crossbred Unit</u> Rs
1. Cost of milch animals (10)	50,000	70,000
2. Cost of construction of a cattle shed	10,000	12,000
3. Cost of construction of a calf shed	3,000	4,000
4. Cost of construction of a small tank and a handpump	1,000	1,000
5. Cost of construction of a small room for office and for keeping equipments etc.	3,000	3,000
6. Cost of construction of a store room	3,000	3,000
7. Cost of equipment such as milk pails, buckets, cans, ropes/chains, chaff cutter etc.	1,500	1,500
8. Misc expenditure	500	500
Total	<u>72,000</u>	<u>95,000</u>

FEED AND FODDER REQUIREMENTS PER DAY

	Rate per kg Rs	In Milk				Dry			
		kg	Buff Cost Rs	kg	CBC Cost Rs	kg	Buff Cost Rs	kg	CBC Cost Rs
Green fodder	0.25	15	3.75	20	5.00	10	2.50	10	2.50
Dry fodder	0.50	7	3.50	4	2.00	8	4.00	5	2.50
Concentrates	1.75	4	7.00	4	7.00	2	3.50	2	3.50
			14.25		14.00		10.00		8.50

DAYS IN MILK

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
1st lot (6)	1620	1620	1800	1800	1620	1800	1440	1800	1440	1800
2nd lot (4)	720	720	960	1080	960	1080	960	1080	1080	1080
Farmbred animals	-	-	-	-	-	360	360	840	780	1440
	2340	2340	2760	2880	2580	3240	2760	3720	3300	4320

DAYS WHEN DRY

540	540	360	360	540	360	720	360	720	360
-	-	480	360	480	360	480	360	360	360
-	-	-	-	-	-	-	270	320	360
540	540	840	720	1020	720	1200	990	1400	1080

OPERATIONAL EXPENDITURE (in Rs)

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
Feeding during LP	33345	32760	39330	40320	36765	45360	39330	52080	47025	60480
Feeding during DP	5400	4590	8400	6120	10200	6120	12000	8415	14000	9180
Feeding of calves	2000	3000	6000	9000	10000	12000	11000	13500	12000	18000
Insurance	2000	2800	2000	2800	2000	3360	2400	3640	2600	4200
Veterinary Aid	800	800	1000	1000	1000	1200	1200	1300	1300	1500
Labour charges	3600	3600	3600	3600	3600	3600	3600	3600	3600	7200
	47145	47550	60330	62840	63565	71640	69530	82535	80525	100560
Cost of replacement	5000	7000	5000	7000	5000	7000	5000	-	-	-
	52145	54550	65330	69840	68565	78640	74530	82535	80525	100560

LP: Lactation Period

DP: Dry Period

INCOME (in Rs)

	1st year		2nd year		3rd year		4th year		5th year	
	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC	Buff	CBC
Sale of milk	79560	84474	93840	103968	87720	116964	93840	134292	112200	155952
Sale of manure	1300	1300	1900	1900	2100	2100	2100	2400	2400	2700
Sale of culled animals	2000	2500	2000	2500	2000	2500	2000	2500	2000	2500
	82860	88274	97740	108368	91820	121564	97940	139192	116600	161152

PROFIT (in Rs)

Income	82860	88274	97740	108368	91820	121564	97940	139192	116600	161152
Expenditure	52145	54550	65330	69840	68565	78640	74530	82535	80525	100560
Profit	30715	33724	32410	38528	23255	42924	23410	56657	36075	60592
Profit per animal	3071 (10)	3372 (10)	3241 (10)	3852 (10)	2325 (10)	3577 (12)	1950 (12)	4358 (13)	2775 (13)	4039 (15)

REPAYMENT OF LOAN (in Rs)BUFFALO UNIT

Loan Amount : Rs 54,000
Interest (Average): 12.5% per annum

Year	Profit Rs	Instalments Rs	Interest Rs	Rs	Surplus Rs	Monthly Surplus Rs
1st year	30715	10800	6075	(16875)	13840	1153
2nd year	32410	10800	4725	(15525)	16885	1407
3rd year	23255	10800	3375	(14175)	9080	756
4th year	23410	10800	2025	(12825)	10585	882
5th year	36075	10800	675	(11475)	24600	2050

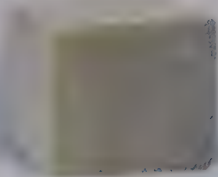
CBC UNIT

Loan Amount : Rs 72,000
Interest (Average): 12.5% per annum

Year	Profit	Instalments	Interest		Surplus	Monthly Surplus
1st year	33724	14400	8100	(22500)	11224	935
2nd year	38528	14400	6300	(20700)	17828	1485
3rd year	42924	14400	4500	(18900)	24024	2002
4th year	56657	14400	2700	(17100)	39557	3296
5th year	60592	14400	900	(15300)	45292	3774

- Interest has been worked out on average outstandings assuming repayment would be monthly and the interest burden would be reduced in direct proportion to the repayment of loan.
- Depreciation has not been taken into account as the same would become part of the repayment.
- Capital assets in terms of herd size have gone up appreciably during the first five year

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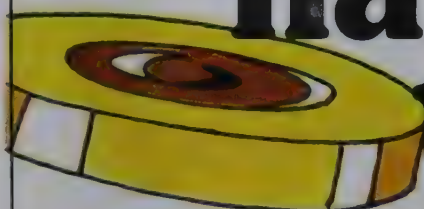
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ICE CREAM

FUNTASTICK PROSPECTS

BHARAT BHUSHAN

Ice Cream Specialist, Supreme Enterprises, New Delhi

ICE cream is perhaps the most misunderstood "food". Children love it to the extent that "any time is ice cream time". On the other hand, the parents bend backward in avoiding ice cream to their young ones under the mistaken belief that it is bad for their health in general, affecting their throats and inviting infection of cold and 'flu'. The fact, however, is that there is no more delightful way to consume milk and all the goodness that goes with it. Since the modern manufacture of ice cream involves pasteurization of milk, ice cream is perfectly safe to consume. Surgeons recommend it after the tonsillitis surgery.

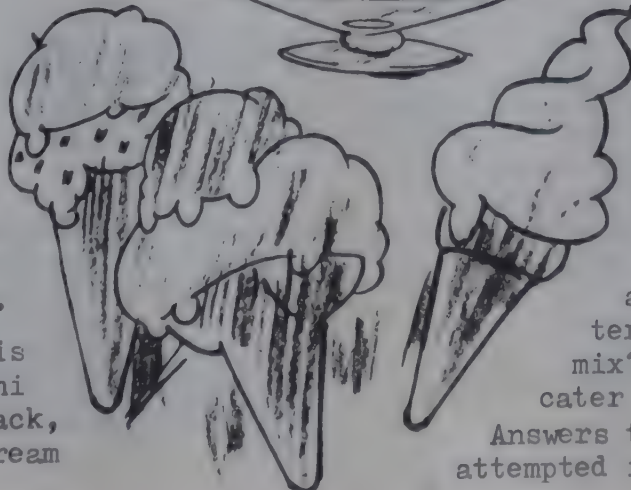
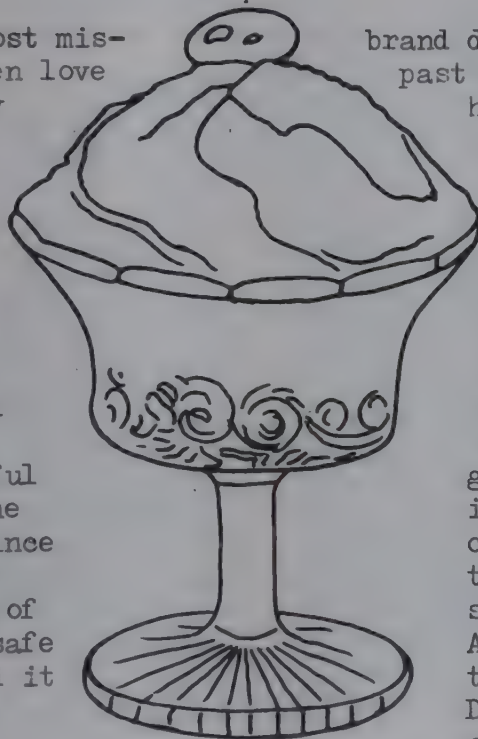
What is the demand for ice cream? Nobody really knows its exact volume, but it is generally agreed that the level of ice cream production and consumption in India represents only the visible tip of the iceberg. According to an industry estimate, the value of annual production of ice cream in India is estimated at Rs 75 crore. But this does not represent the demand which is manifold.

One classic instance is the behaviour of the Delhi market. Even ten years back, there was only one ice cream

brand dominating the capital. In the past decade, two more major brands have been added, but they have not survived by intruding into the market of the first one. On the contrary, the first brand has doubled its sales volume to some six crores of rupees, and the other two have got a market of another four crores. This spectacular growth came in response to added competition and new marketing strategies. In fact, another big brand is ready to make its debut in the capital, and there is no doubt that its entry would give an added stimulus to the dormant market. All this goes to show the fantastic prospects for ice cream in Delhi, and more so in large parts of the country which are inadequately served by the existing network. This is particularly true of Central and Eastern India: See Table Nos 32-36.

The technical aspects of ice cream production are well-known and can be dependent to give the desired quality and quantity. Not so the marketing aspects which can elude the technocrat. Like in any other field, marketing is both a science, and an art. More so, the latter. What should be the product mix? What level of market to cater for—elite, the mass, or...?

Answers to these questions have been attempted in the following pages.



Feasibility Study

Take a small ice cream unit with the production capacity of 225 litres of ice cream and 1,600 pieces of water ices per shift of eight hours. The capital investment for such a unit totals Rs 4 lakhs while working expenditure amounts to around Rs 11.00 lakhs per year. Such a unit can in the very first year expect to generate annual sales exceeding Rs 14.00 lakhs assuming 100 per cent sales for only five months in a year, diminishing sales for five months and no sale for the remaining two months of winter. An ice cream unit includes one pasteurizer, aging vat, homogenizer, batch freezer, surface cooler, brine tank-cum-pad tank, deep freezers, etc.

Pasteurizer: The internal tank is of stainless steel heavy gauge. The outer tank is of mild steel and insulated with glass-wool. It has one reduction gear box with electric motor and one stainless steel agitator. One dial thermometer is fitted on top for temperature recording. The product is heated to 155°F and is held at this temperature for 30 minutes. The process renders the ice cream mix substantially free of pathogenic bacteria.

Homogenizer: It is a two-stage unit with water-cooling system; 3,000 psi pressure, fitted with 3 hp three-phase motor and a pressure gauge. The process of homogenization breaks up the large globules of mix into small particles of less than two mic-

rons in diameter. It is essentially a high pressure pump with a homogenizing valve.

Surface Cooler: It consists of two stainless steel sections—water cooled and gas cooled. The mix from homogenizer goes to surface cooler. It is cooled to 32 to 40°F and is then passed on to aging vat.

Aging Vat: It is a stainless steel storage tank similar to pasteurizer, but having an additional $\frac{1}{2}$ " copper coil of approximately 50 ft length and includes a condensing unit and an agitator.

Freezer: It is the heart of ice cream operation. The unit comprises 5-gallon capacity batch freezer, a 7.5-ton compressor, a 5 hp motor. The functions are to freeze a portion of the water in the mix and to incorporate air into the frozen product to give it the desired body.

Brine Tank: This tank is of 10-mould capacity. Its size is 8'x2'x3' high made from 6 mm thick plate. The tank is insulated with 8" thick thermocole at the bottom, side and top. The sides are covered with GI casing and the top end is removable and covered with aluminium sheet. It has a vertical agitator on the side and 7.5 ton compressor. The tank is filled with brine. It is used for making ice lollies as per shape and size of the moulds. It is also used for freezing the pads for transportation of ice cream.

Economic & Technical Feasibility

In assessing the economic and technical feasibility of an ice cream unit, the suitability or availability of the following should be looked into: Location of the unit; Building to house the unit; Assured power and water supply; Raw materials and inputs; Experienced staff and labour; Efficient marketing infrastructure; and, Facilities for quality control tests.

Income from an ice cream unit depends upon a number of factors. The more important of them include:

Capital investment: It varies with the size of unit. On equipment alone, it may amount to Rs 4.0 lakhs for a unit of 225-litre per day capacity. Excluded is the cost of civil works and land.

Location: The unit should be located at a place where raw materials are easily available. The sale points should be near. The cost of transportation is high because the products require refrigeration in transit. There should be assured and uninterrupted supply of power and water in the area.

Choice of equipment: It is crucial in terms of economic ice cream production. For example, the batch freezers selected should be of good quality and in which approximately 60 per cent of water should be frozen.

Area of shed: For a small unit, the area required would be approximately 1,500 sq ft and an open space of 500 sq ft for storing push carts, ice, etc.

Water requirements: It would depend on the size of the unit. For practical purposes, it has been observed that on an average the quantity of water required is 10 times the quantity of milk/mix used.

Power requirements: The electric power supply required is 50 hp for a small unit.

Marketing: An ice cream unit to be commercially viable, must have well organized marketing infrastructure. Promotional and advertising campaigns, aimed at both the consumer and the caterer, can boost sales.

Profitability: The annual gross profit on sales works out to over Rs 2 lakhs on a total annual sale of Rs 14 lakhs.

In the following pages is given the financial statement for setting up a small-scale ice cream unit.

How is Ice Cream Made

- The secret of successful ice cream making relies on the use of high quality ingredients, largely fresh milk and cream, skim-milk powder and sugar. The ingredients of the mix are blended in proper proportions. To this mix are added in small quantities functional ingredients such as stabilisers and emulsifiers which prevent the formation of ice crystals in the ice cream after it is frozen. All ingredients are tested for quality before use and at every stage in the manufacturing process.
- Subsequently, the mix goes to pasteuriser to rid the mix of any harmful bacteria. It is heated and held at a pre-determined temperature for a specified period of time.
- The hot mix then goes to the homogeniser where, under pressure of 2,000 to 2,500 pounds per square inch (psi), milkfat globules are broken into still smaller particles of 2 microns and less. This process ensures the beautiful smooth texture of the ice cream.
- After homogenisation, the hot mix is quickly cooled in the surface cooler. Then, the cool mix is transferred to aging vats for five to six hours.
- The ice cream mix, along with air, is then pumped into the freezer where it is converted into ice cream. This process calls for simultaneous whipping and freezing. High speed blades in the freezer whip the mix and air together to form a creamy mix. It is at this stage that fruits, nuts and other ingredients are added.
- Although frozen, the ice cream is still soft enough to be poured into cones or cups or moulds of different shapes. Ice cream wouldn't be ice cream but for the air. Without this aeration, the finished product would be a solidly frozen mass which just couldn't be eaten. Whipping air into the mix helps make sure that ice cream is smooth and easy to scoop. This aeration is called "overrun".
- After freezing and filling, ice cream goes to the "hardening room" where sub-zero temperatures (-25°C) further harden the ice cream. The "rapid hardening process" that takes place also ensures a smoother ice cream. If this extra process didn't take place or happened too slowly, coarse crystals of ice cream would form which would ruin the delightful creaminess of the ice cream.
- Subsequently, it is transported in refrigerated insulated vans, packed in insulated shippers, containing dry ice and/or eutectic pads for delivery to distributors/retailers.

FINANCIAL STATEMENT FOR SETTING UP A SMALL SCALE ICE CREAM UNIT OF 225 LITRES PER DAY CAPACITY

The statement given below is only a guideline to help in evaluating the economic feasibility of an ice cream unit. Due consideration should be given to the fact that prices differ from place to place and change under the impact of prevailing economic conditions. For a realistic appraisal, local prices of various inputs and equipment should be ascertained and used. Also, the duration of sale of ice cream varies from region to region. The production of ice cream will be on continuing basis, assuming the year to be of 300 working days. This statement is based on 75 per cent of the capacity utilization taking into account nil sale for two months during winter and limited sale during five months. During summer months, the production would be at its peak involving as many as two-three shifts with temporary labour, as required.

CAPITAL INVESTMENT

	Rs
To cost of pasteurization unit (150-lb capacity)	20,000
To cost of homogenization unit (40-gallon capacity)	30,000
To cost of surface cooler (40-gallon capacity)	25,000
To cost of aging vat (150-lb capacity)	20,000
To cost of batch freezer unit (5-gallon capacity)	25,000
To cost of brine tank (10-mould capacity)	30,000
To cost of 3 deep freezers (40 cubic ft each)	75,000
To cost of 15 push carts	30,000
To cost of laboratory equipments	8,000
To cost of 10 moulds @ Rs 500 each	5,000
To cost of defrosting tank @ Rs 3,000 each	3,000
To cost of 10 shippers @ Rs 800 each	8,000
To cost of 10 pads @ Rs 200 each	2,000
To cost of one cooling tower	10,000
To cost of accessories for batch freezer-compressors etc	25,000
To cost of accessories for brine tank-compressors etc	30,000
To cost of aging vat accessories	6,000
To cost of boilers (100 lbs.)	10,000
To cost of tube-well	10,000
To cost of 10 aluminium cans @ Rs 500 each	5,000
To cost of 5 steel table etc	10,000
To erection, installation, etc	13,000
	4,00,000

WORKING EXPENDITURE

To cost of raw material and stores consumed:

Freezer Varieties:

30,000 litres mix @ Rs 9.50 per litre	2,85,000
Nuts to be added @ 10 kgs/100 litres in 20% mix, i.e., 600 kgs @ Rs 75 per kg	45,000
Essence to be added @ 1 litre/200 litres mix, i.e., 150 litres @ Rs 100 per litre.	15,000
Colours to be added in 50% mix, @ 100 ml/100 litres mix, i.e., 15 litres @ Rs 50 per litre	750
Packing material @ Rs 4 per litre of mix	1,20,000
A:	4,65,750

Brine Tank Varieties:

Raw materials for mix, 24,000 litres @ Rs 2.50 per litre	60,000
Inner packing material for 4,80,000 lollies + 10% wastage, i.e., 5,28,000 lollies @ Rs 75 per 1,000	39,600
Outer packing material for 4,80,000 lollies + 10% wastage, i.e., 5,28,000 lollies @ 80 p per pack of 20	21,120
Wooden sticks for 4,80,000 lollies + 50% wastage, i.e., for 7,20,000 lollies @ Rs 15 per 1,000	10,800
Tape Rolls	4,000
B:	1,35,520

Total cost of raw materials (A+B)

6,01,270

To wages to staff and labour:

One manager @ Rs 2,000 pm, two supervisors @ Rs 800 pm, one skilled worker @ Rs 600 pm, five unskilled workers @ Rs 500 pm, one accounts clerk @ Rs 500 pm, and one chowkidar @ Rs 500 pm, plus 10% benefits	1,01,640
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To Power and fuel charges @ Rs 3,000 pm 36,000

To Water charges @ Rs 1,000 pm 12,000

To rent @ Rs 3,000 pm 36,000

To administrative charges @ Rs 1,500 pm 18,000

To cost of publicity and advertising 50,000

To hire charges of four delivery vans @ Rs 150 per day 1,80,000

To cost of dry-ice 45,000

To wastage @ 3% of raw material 18,000

10,97,948INCOME (per annum)By sale of 60,000 litres of freezer variety ice cream
@ Rs 17 per litre 10,20,000By sale of 4,80,000 lollies @ 0.80 per piece 3,84,00014,04,000PROFIT (per annum)

Income 14,04,000

Expenditure 10,97,948Gross Profit 3,06,052

Less depreciation on machinery @ 10% 40,000

Less interest on capital @ 14% (including 4% rebate for SSI) 56,000Net profit before tax 2,10,052

TABLE 32. Ice cream sales regionwise.

	North	West	South	East & Central
Percent	31	40	12	17
Volume (lakh litres)	161	210	63	91
Value (Rs crores)	23	30	9	13

TABLE 33. Ice cream sales by types.

	Percentage			
Types	North	West	South	East & Central
Lollies & Stick Ranges	25	30	30	25
Ice Cream/Novelty Ranges	75	70	70	75

TABLE 34. Ice cream consumer preference by flavours.

	Percentage			
Flavours	North	West	South	East & Central
Vanilla	30	20	30	30
Nuts	15	15	15	10
Water Ices/Ice Lollies	13	20	10	15
Strawberry	11	10	14	10
Cassatta	8	5	8	12
Double-coloured	7	10	8	8
Chocobar	5	10	5	5
Others including novelties	11	10	10	10

TABLE 35. Mode of ice cream sales.

Percentage

Mode of sale	North	West	South	East & Central
Across the counter sales (Dealer)	40	40	50	50
Push-Cart sales	30	-	-	-
Outstation sales	15	15	15	20
Party-order (marriages, etc)	10	25	15	20
Institutional (Hotels, Clubs, etc)	3	15	15	5
Others	2	5	5	2

TABLE 36. Regionwise trends in the consumption/sales of ice cream by months/seasons, assuming the peak sales in May with sales index at 100.

Months	North	West	South	East & Central
January	20	50	40	20
February	30	70	50	30
March	50	80	60	50
April	82	85	70	80
May	100	100	100	100
June	85	80	85	80
July	63	50	50	60
August	60	50	40	50
September	63	75	50	65
October	58	85	70	70
November	30	60	60	50
December	22	60	50	30

**Turnkey Installation of :
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Ice Cream Plants
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CHEESE

Dr A.K. CHOUDHERY

Managing Director, Ashish Technical Services, New Delhi

CHEESE is among the oldest familiar food known to man, dating back to about 9,000 years before Christ -- centuries before recorded history. Cheesemaking has been known to the old world since the misty ages of early Sumerian civilization. References to cheese as a staple diet are found in manuscripts from the year 2000 BC. Cheesemaking was an agricultural achievement of the first importance. The economic and nutritional importance of cheese was recognized from the earliest times as a method of keeping highly perishable milk in solid and relatively stable form. Its food value as a source of fat and protein concentrate in highly nutritious and palatable form was recognized by the ancient men from the beginning.

Through the centuries, variations in cheese manufacturing procedures have resulted in the production of thousands of different cheeses which range in flavour from extremely mild to very sharp, and in texture from semi-solid to almost stone-hard. No other common food exhibits such wide variety.

Cheeses are classified in large general groups according to whether they are started by the rennet or lactic acid method. They may be further classified as hard, semi-hard and soft; or as uncured, mold-ripened or bacteria-ripened. Cheese may be made from the milk of any milk-giving animal, though it is generally made from cow's milk. In India it is also made from buffalo milk.

Cheesemaking is both a science and an art. While the science of cheese production is well-known, not so its art which accounts for thousands and thousands of varieties of

cheese in demand all over the world. The blending of cheese is critical to the success of cheese manufacture, as also curing of the cheese when it develops its body, taste and flavour.

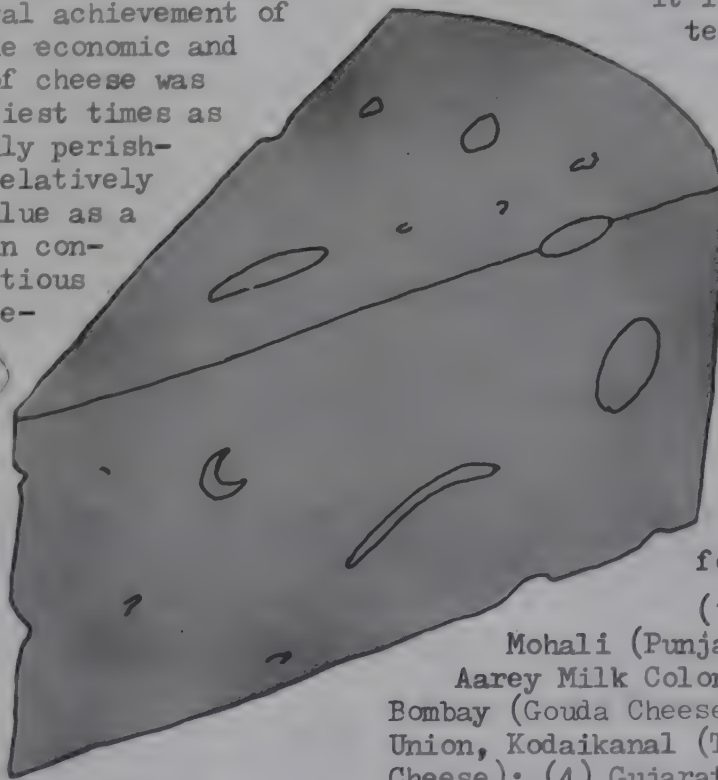
Commercial production of cheese in India dates back to the early 'sixties.'

It is currently confined to ten major producers. Almost half of the annual production of 3,000 tonnes is accounted for by one brand name: Amul, produced by the Kaira District Cooperative Milk Producers Union Ltd, Anand. The second major brand is Vijaya from Andhra Pradesh, produced by Chittoor District Cooperative Milk Producers Union Ltd. The other eight producers are as follows:

(1) Feeder Balancing Dairy, Mohali (Punjab)---(Verka Cheese); (2) Aarey Milk Colony---Student Dairy Plant, Bombay (Gouda Cheese); (3) Cooperative Milk Union, Kodaikanal (Tamil Nadu)---(Kodai's Cheese); (4) Gujarat Dairy Dev Corpn, Gandhinagar (Gujarat Cheese); (5) Ashish Enterprises, New Delhi (Dr Choudhery's Cheese); (6) Aravali Cheese Co (P) Ltd, New Delhi (Aravali Cheese); (7) Ashish Foods Pvt Ltd, New Delhi (Ashish Cheese); (8) Ashish Cheese Products, New Delhi (Asli Cheese).

Four Projects for the production of cheese are in various stages of implementation. These are:

(1) Niligris District Cooperative Milk Producers' Union Ltd, Ootacamund (Tamil Nadu); (2) Rajasthan Cooperative Dairy Federation Ltd, Jaipur (Rajasthan); (3) Kerala Livestock Development & Milk Marketing Board, Trivandrum; (4) Sikkim Livestock Development Corporation, Gangtok.



In addition, there are two experimental units, located at the Dairy Science Colleges of the National Dairy Research Institute at Karnal and Bangalore, with a limited production of 50-60 tonnes. They are used for teaching purposes and the production is sold locally.

The present demand for cheese in India is 5,500 tonnes annually and confined to urban centres and the armed forces. Almost all the cheese available in the country is confined to processed cheese only. Very little of natural Cheddar, Mozzarella, Cheese Spread, Spiced Cheese and the like are in the market. The five-star hotels import special varieties of cheese to cater to the palate of foreign tourists.

With the cultivation of taste for cheese spreading among the city dwellers who are also conscious of its nutritive value, the demand for cheese, particularly its varieties, has been gathering momentum in recent years.

Presently, almost all cheese produced is packed in tins (200/400 gms) or as 25 gm chiplets. No cheese is sold in convenient packages in sliced form, plastic cups, glass jars, collapsible tubes, etc. Neither it

comes shrink-wrapped under vacuum in plastic film. Besides convenience, such packagings will also reduce the production cost while stimulating its demand further.

Time is now ripe to introduce a variety of cheeses in handy, convenient packs to tap the growing potential market, particularly in the metropolises.

Today, cheese is retailed for Rs 55 in the market, and its wholesale price is around Rs 47, while its production cost is about Rs 42 per kg.

Small entrepreneurs with their low overheads can profitably take to cheese production. Such projects need a small capital of Rs 4 to 5 lakhs or so and production can start within four months, generating an annual turnover of about Rs 30 lakhs. Being small it gives them the added advantage of flexibility in their operations and in their ability to develop the desired varieties in response to market demand. The shed space is about 500 sq ft and almost all raw material and bulk of the machinery and equipment needed is indigenously available. The imported component is one essential raw material, rennet and the packing machine, which can be obtained easily under Open General License.

Economic & Technical Feasibility

The production of cheese provides an economic and profitable way of converting the surplus milk into a value-added product of long shelf-life.

Location: The plant should be located near the source of supply of raw material—milk. It should also be well connected by transport so as to supply the end-products to the distributors/retailers.

Land & Building: An industrial shed of some 1,500 sq ft covered area is adequate for the project. To reduce the capital cost, it may be hired on monthly rental basis, through a long-term lease agreement with its owner. The shed will house all facilities for the production and packaging of cheese as well as for its storage.

Capacity: The rated capacity of a viable unit can be 250 kg per day on the basis of

one shift working and 300-day production. The actual output would be 200 kg.

Raw materials: Milk is the main raw material. Its total requirement works out to be 1,100 litres per day. In addition, 50 kg/day of natural cheddar cheese will be required to be purchased for blending it with the fresh cheese made in the proposed unit.

Plant & Machinery: The plant and machinery include: milk cans, weighing scale (platform type), boiler, counter-pan weigh scale, cream separator, vat, set of test equipments, walk-in coolers, mincing machine, processing kettle, plastic crates, stainless steel top table, water storage and feed water tank, vacuum packing machine, processing and services pipeline, etc. Except for packing machine which would have to be imported, all other equipments are indigenously available.

Power: The total power requirement works out to 10 hp. Ensure that this load of power is available at the selected site.

Water: Total requirement of water is about 5,000 litres per day. It should be sweet and soft. Provision should be made for storage tank.

Fuel: Coal/wood is the main fuel required for the generation of steam by the boiler. Ensure its availability.

Effluent: Steps should be taken to ensure that the effluent is rendered harmless and will not be toxic, as per the requirements of the pollution board.

Implementation: The time-frame is four

months from the date of sanction of loan by the financial institution, includes the ordering of machineries, their installation, trial run and commercial production.

Marketing: Along with institutional buyers, direct consumer market should also be tapped, because cheese will be produced in consumer packs. Distributors interested must be contacted in advance for smooth marketing arrangements. The role of the thumb provides for 17 per cent commission shared between distributors and retailers.

Profitability: The net profit on sales works out to over Rs 2.6 lakhs on a total annual sale of Rs 29 lakhs.

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FINANCIAL STATEMENT FOR THE PRODUCTION OF 200 KGS OF CHEESE PER DAY

The statement given below is only a guideline to help in evaluating the economic feasibility of a cheesemaking unit with a rated capacity of 250 kgs per day on the basis of working on one shift of eight-hour duration for 300 days. It also assumes production based on 80 per cent of the installed capacity. Due consideration should be given to the fact that prices vary from place to place and change under the impact of prevailing economic conditions. For a realistic appraisal local prices of various inputs and equipment should be ascertained and used.

<u>CAPITAL EXPENDITURE</u>	Rs	Rs
Plant and machinery:		
(a) 20 milk cans of 40 litres each @ Rs 275 each	5,500	
(b) One weighing scale (platform type) of 100 kg	1,500	
(c) One boiler of 200 kgs/hr water evaporation capacity	26,250	
(d) One counter pan weigh scale of 2 kg	250	
(e) One cream separator of 165 litres/hour capacity	4,400	
(f) One vat of 500 litre capacity	2,500	
(g) Test equipments	4,500	
(h) Two walk-in coolers (8'x8'x8' and 6'x6'x8')	1,01,000	
(i) One mincing machine of 100 kgs/hour capacity	1,500	
(j) One processing kettle of 60 litres capacity	20,500	
(k) 30 plastic crates of 10 and 20 litres capacity @ Rs 80 each	2,400	
(l) One stainless steel top table	5,000	
(m) Water storage and feeder tank of 5,000 litre capacity	3,700	
(n) One vacuum packing machine	60,000	
(o) Processing and service pipeline	10,000	
(p) Miscellaneous, taxes, erection, commissioning, etc.	20,000	
		2,69,000
Contingencies		25,000
Preoperative expenses		10,000
Margin money for working capital		50,000
		3,54,000

RECURRING EXPENDITURE (per annum)

Rs

Rs

Raw materials:

Cost of 3,30,000 litres of milk (4% F & 8.8% SNF) @ Rs 3.40 per litre	11,22,000	
Cost of 15,000 kgs of cheddar cheese @ Rs 50 per kg	7,50,000	18,72,000
Cost of 10 kgs of rennet @ Rs 2,000 per kg	20,000	
Cost of consumables @ Rs 2.75 per kg of cheese processed	1,65,000	
Packing materials @ Rs 3 per kg of cheese processed	1,80,000	3,65,000

Utilities:

Power (10HP)	15,000	
Fuel: Rs 80/day of coal/wood	24,000	
Water @ Rs 300 per month (5,000 LPD)	3,600	
Rent @ Rs 3,000 per month	36,000	
Wages to 8 workers @ Rs 25 per worker per day	60,000	
Overheads	20,000	1,58,600

Sales Promotion including advertising

1,00,000

24,95,600

or say: 25,00,000

INCOME (per annum)

Sale of 45 tonnes of Plain Cheese @ Rs 47 per kg and 15 tonnes of Special Cheese @ Rs 52 per kg	28,95,000
---	-----------

PROFIT (per annum)

Income	28,95,000	
Expenditure	25,00,000	3,95,000
Less depreciation on machinery @ 15%:	40,350	
Less interest on capital @ 18%:	90,720	1,31,070
Profit before tax:		2,63,930

Yoghurt — Then and Now

The discovery of yoghurt seems locked in the annals of history. There is no precise record of when or where it was first made. Ancient legends suggest that during Biblical times, people in the Middle East discovered yoghurt when they left milk in a warm place. Although its origin is lost in antiquity, there is little doubt about its popularity all over the world. It is known as "dahi" in the Indian sub-continent, "najo" in Bulgaria, "zabady" in Egypt and "mast" in Iran.

From time immemorial, yoghurt has been made by fermentation. In this process, desirable bacteria convert lactose (milk sugar) into lactic acid. The lactic acid thickens the milk and creates the tangy aroma and flavour, characteristic of yoghurt. Its simplicity, naturalness and nutritional importance makes it popular. It is a complete food, being richer in milk nutrients than milk itself. One 200 g pack of natural yoghurt is equivalent to one 250 ml cup of milk.)

Traditionally, yoghurt is prepared from the milk of goat, cow or buffalo, boiled in clean earthenware pots over a slow fire until volume is reduced by one-fourth, one-half or more. Then, it is cooled to 45 or 50°C, after which a small amount of "maya" or ferment is added. The ferment is a left-over from a former batch. After mixing thoroughly with the freshly boiled milk, the pot containing the mixture is wrapped in skin or cloth so as to hold an even temperature for 10 to 12 hours. Yoghurt is then ready for use. It is a jelly-like product, sweet to taste, with a pleasing odour. Enough acid has developed to cover up the boiled taste of the product.)

At home, yoghurt can be made simply by adding a small portion of commercial natural yoghurt to milk. The commercial yoghurt will contain the cultures of two desired bacterial strains in equal quantities to start the reaction. If the sample of culture is not fresh, then the bacterial strains can be in unequal proportions and may affect the overall palatability of the yoghurt in flavour and texture.

Another important precaution: never combine the commercial yoghurt with milk which is hotter than 45°C, as excessive heat will kill the culture and prevent the normal bacterial reaction. Always hold the mixture at 45°C for about 12 hours. Even though cool temperatures may deter the reaction, the bacteria within the newly-made yoghurt will continue to grow with improvements over two-three days of refrigerated storage. After several days, the acidity may become unpalatable.

Sub-culturing simply means retaining two tablespoons of your freshly-made yoghurt for use as the culture in the next batch. This process should be repeated only two-three times. After then, the sub-cultures are not in their desired ratio to result in an unpalatable yoghurt. It is wise after the third batch to revert back to a freshly-purchased commercial yoghurt as the starter culture.

To get a firmer consistency, add one-two tablespoons of skimmed milk powder in 500 ml milk. Homogenized milk is the best choice to produce a smooth, velvety texture and prevents cream formation.

YOGHURT

Dr S.C. JAIN

*Assistant Director-General (Dairying & Animal Products Technology),
Indian Council of Agricultural Research*

YOGHURT and 'Dahi' are the two sides of the same coin, the former being a Western product and the latter, an indigenous fermented milk product. With the growing importance of fermented milks in our diet, yoghurt has also come to assume significance in the Indian dairy industry. Dahi is a product with a glossy and semi-glossy, velvet-like appearance, medium firm body and moderately acidic and delicate flavour. Yoghurt is a fermented dairy product with a semi-solid, custard-like consistency and pronounced typical fruity flavour. The product is now available in different forms e.g. flavoured, fruit, sweetened, frozen and fluid yoghurt. Fluid yoghurt is a bottled drink, whereas frozen yoghurt is somewhat like ice cream.

The techniques used for preparing both these fermented milks are almost identical. In their preparation, cow/buffalo/skim milk or reconstituted milk, with or without skim milk powder, can be used. The milk should be bacteriologically and chemically of good quality, free from neutralizer, preservatives, antibiotics and foreign matters.

The milk for yoghurt making is generally standardized to about 5 per cent fat and 11-12 per cent SNF to develop desirable body in the product, although it can be prepared with milk having fat and SNF ranging from 0 to 5 per cent and 9 to 20 per cent respectively. This may be accomplished by either adding skim milk powder or by concentrating milk by desiccation. In the case of dahi, no such standardization is necessary.

For dahi making, milk is heat-treated at 90°C for 10 minutes (bring it to boil under home conditions) and cooled to 25°C without exposing to atmosphere before inoculation, whereas in the case of yoghurt, the milk is also treated the same way, but before the heat-treatment, it is standardized and homogenized at 60°C temperature and at 100 kg/sq cm pressure. The homogenized milk is heat-treated to 90°C (bring it to boil under home condition) and immediately cooled to 45°C before it is inoculated with the starter culture. In the case of sweetened yoghurt, sugar is added at the rate of 6 per cent in the form of syrup which had been previously heat treated. Flavours of choice are added at desirable level to prepare the flavoured yoghurt. For preparing fruit yoghurt, the pulp of the fruits (orange/pineapple/mango/strawberry etc) may be added at the rate of 10-15 per cent of the product.

In the case of dahi, the cooled milk is inoculated with active dahi starter culture at the rate of one per cent and mixed thoroughly. If dahi is required to be served in plastic cups or wide-mouth glass bottles or in any other suitable container, the inoculated milk is distributed in desired containers. These containers are then placed in an incubator or in a closed place where a temperature of 25°C is maintained. At this temperature, the inoculated packaged milk is incubated for 12 to 18 hours. However, if the rate of inoculation is higher, the time of incubation is reduced.

The bacterial cultures used for dahi-making include Streptococcus cremoris, S. Lactis, S. Lactis sub. sp. diacetilactis, Leuconostoc citrovorum and L. dextranicum. In certain cases the bacteria, S. thermophilus and Lactobacillus bulgaricus may also be present in the starter culture. In the latter case, temperature of incubation would range from 37 to 42°C and the resulting product would give a rather sharp acid flavour. The setting time will be considerably reduced.

In case of yoghurt making, a specific bacterial culture consisting of S. thermophilus and L. bulgaricus is used at the rate of two per cent of the product. Inoculated milk is packaged, as in case of dahi, and is incubated at 42°C (42 to 45°C) for three to four hours. The set product, whether dahi or yoghurt is stored at refrigeration temperature (5 - 7°C) till consumption. These products can keep well at this temperature for five to seven days.

The technology for yoghurt-making has considerably advanced during recent years, and a variety of yoghurt with different flavours is now available in the markets of Western world. Recently, the National Dairy Research Institute, Karnal, has developed a good quality yoghurt with enhanced flavour and desirable acid production by incorporating leuconostoc bacteria along with standard yoghurt cultures. In order to improve the nutritive and therapeutic values of yoghurt, the yoghurt starter cultures have been supplemented with Bifidobacterium bifidum and Lactobacillus acidophilus separately or in combination.

Since the manufacture of fermented milks involves the incorporation and multiplication of desirable micro-organisms, it is absolutely essential that hygienic conditions are maintained throughout the manufacturing process. Any contamination either through hands, utensils, containers or the packaging material or through environment/surroundings will prove detrimental to the quality of product. In case the manufacturing conditions are not controlled, the finished product would suffer from body, texture and flavour defects. Its consumption will prove injurious to health.

A standard product whether yoghurt or dahi possesses very high nutritive and therapeutic value and is unique source to implant the desirable micro-organisms

in intestines thereby controlling the growth of undesirable micro-organisms, responsible for causing intestinal disorder. The fermented milks, particularly the yoghurt are well-known to have antibiotic properties and are considered to induce longevity in the regular consumers.

It is extremely difficult to maintain a standard quality of the fermented milk product from day to day since the spoilage is due to micro-organisms invisible to the naked eye. In a tropical country like India, the prevailing conditions are conducive to the growth of bacteria both the useful and harmful. This situation, therefore, poses a problem before a dairy technologist to prepare a standard product and to guarantee its quality until it reaches the hands of the consumer.

It is not possible to maintain 'cold chain' for the effective storage of dairy products in our country. If at all the refrigeration temperature is maintained from the manufacturing point to the consumer's hands, the production costs would go very high and the products would be beyond the reach of common consumers and will thus be treated as a luxurious item. These are the reasons why the manufacture of fermented milks including yoghurt and dahi could not be successfully taken up on commercial scale by the organised sector so far in our country.

Of late, however some efforts have been initiated by some dairies/factories on limited scale in this direction. With the advanced manufacturing technologies and innovative packaging systems, these difficulties will no more remain unsurmountable. So, it would be possible for the dairy manufacturer to control the microbiological quality during manufacture, storage and distribution of fermented milks in the near future in our country. The real discernible breakthrough would be possible only then. The future of fermented milk industry in our country is bright and will be brighter in the years to come. ■

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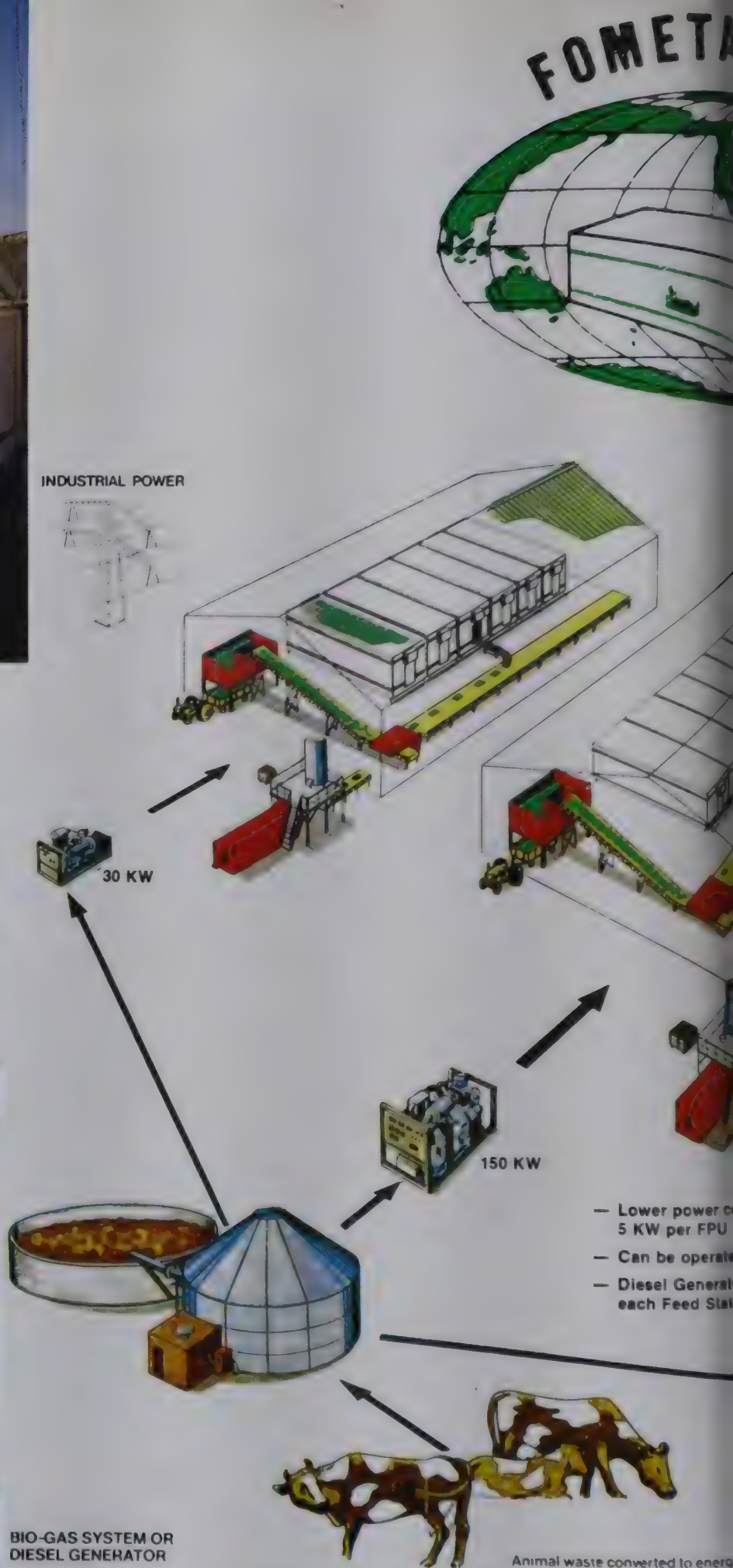
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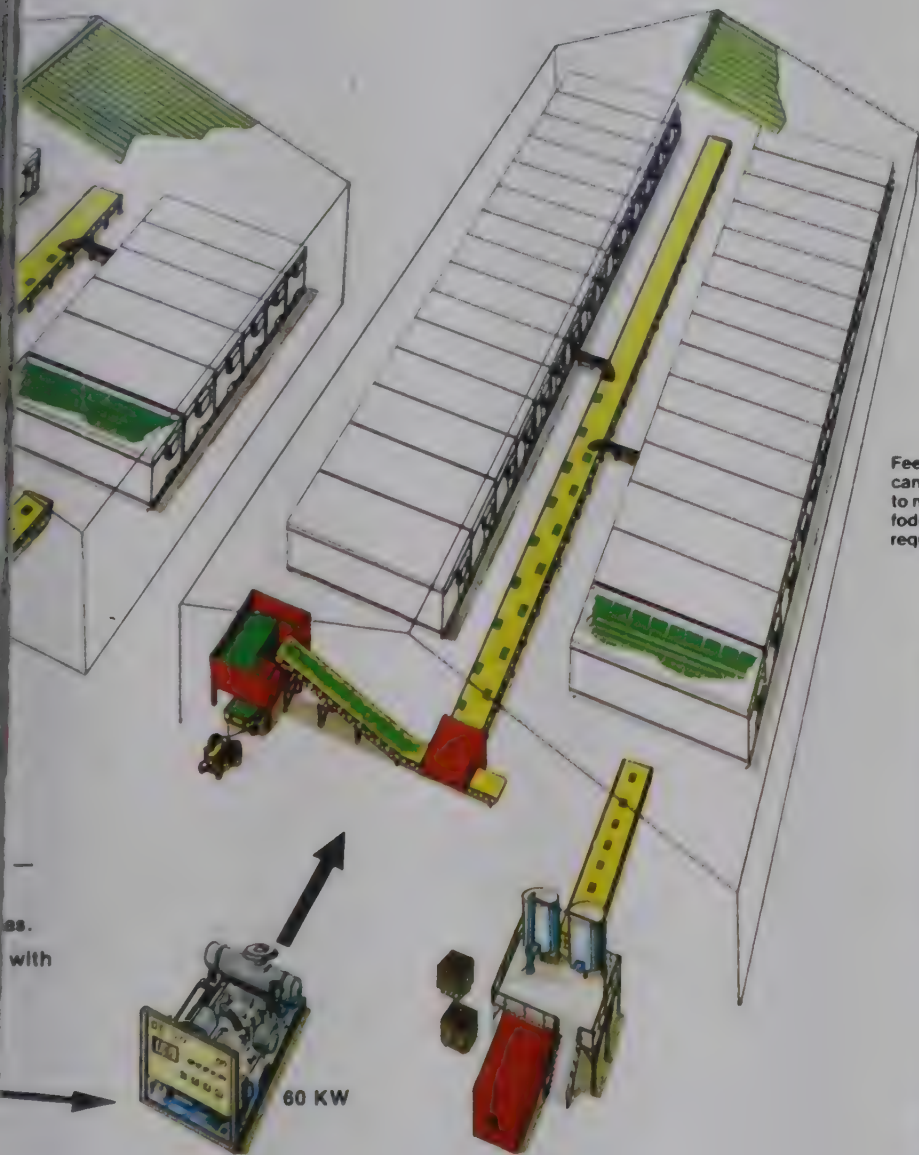
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Management Pointers

Sound management practices are essential for profitable dairy farming. Important points of scientific management techniques are given below to help dairy farmer make their operations efficient and productive.

HOUSING

Cattle shed should be located on a high, well-drained land. A 5-metre wide and 7-metre long cattle shed can provide enough room for six cows.

The walls of the shed should be 1.5-2 metres high preferably cement plastered to make them damp proof. The roof should be 3-4 metres high supported on pillars. The cattle shed should be well ventilated. The floor should be hard, even, non-slippery, impervious, well sloped (3 cm per metre) and properly drained to remain dry and clean. A standing space of 2 x 1.05 metre for each animal is needed. Provide 0.25 metre broad pucca drain at the rear of standing space, 1.05 metre manger in front at a height of 0.5 metre with a depth of 0.25 metre. Corners in mangers, troughs, drains and of walls should be rounded for easy cleaning. There should be provision for adequate supply of water from wells and/or tubewells for drinking and for washing the shed.

Provide 5-10 sq metre loaf space for each animal.

Use cow dung for the production of biogas to save expenditure on fuel and light.

In summer provide proper shade and cool drinking water in a watering trough. Allow buffaloes to wallow in clean water as long as possible. Wash buffaloes or sprinkle water if wallowing facilities are not available.

In winter and during rain, keep animals under cover especially at night. It may be desirable to provide individual bedding daily. Give extra feed during extreme cold.

Maintain sanitary conditions around the cattle shed.

SELECTION OF ANIMALS

Cows/buffaloes should be selected in the second year of lactation, preferably in the first month with female calf at the

heel. For successful selection, information/record of its past performance and that of its ancestors should be studied.

HEALTH CARE

Keep animals under sanitary conditions. Pay attention to the following:

Vaccinate the animals regularly against Rinderpest, Haemorrhagic Septicaemia and Foot & Mouth Disease and other diseases, e g, Black Quarter, Anthrax and contagious bovine pleuro-pneumonia if these occur in the area regularly. A schedule of vaccination may be prepared in consultation with a veterinarian, keeping in view the local disease pattern and the type of animals reared.

Get the animals tested against Brucellosis, Tuberculosis and Johne's disease. Similarly, animals may also be got tested for gastrointestinal parasitic load through faecal examinations.

Conduct periodic microscopic examination of faeces to detect eggs of internal parasites. Treat with suitable drugs, whenever required.

For the control of external parasites, e g, ticks, lice, mites, animals and the sheds should be sprayed with insecticides, e g, BHC, Malathion.

If parasitic load is judged as abnormal, the animal should be dewormed using the medicine prescribed by the veterinarian. Calves tend to suffer more from internal parasites and must be given due care.

Newly purchased animals should be quarantined for a period of about four weeks and kept under observation before mixing with the general herd. During this period, the animals must be given necessary vaccination against infectious diseases prevalent in the area, sprayed with insecticides and preferably dewormed.

In case of outbreak of a contagious disease, immediately segregate the sick, the

TABLE 37. Housing requirements for crossbred cattle.

Age group	Manger space (m)	Standing or covered area (sq m)	Open space (sq m)
4-6 months	0.2-0.3	0.8-1.0	3.0-4.0
6-12 months	0.3-0.4	1.2-1.6	5.0-6.0
1-2 years	0.4-0.5	1.6-1.8	6.0-8.0
Cows	0.8-1.0	1.8-2.0	11.0-12.0
Pregnant stock	1.0-1.2	8.5-10.0	15.0-20.0
Bulls*	1.0-1.2	9.0-11.0	20.0-22.0

*To be housed individually.

TABLE 38. Estimated daily water intake of various groups of cattle.

Bodyweight (kg)	Litres per day by temperature*	
	20°C	30°C
Dairy heifers		
50	3.6	5.3
100	11.0	16.3
200	20.0	26.5
300	27.3	37.0
400	35.2	46.2
Lactating dairy cows**		
400	26.5	27.0
500	31.0	32.0

*Estimates include both the free water consumed and water contained in the feed.

**Not including allowance for production.

Source: NDRI Handbook (Production), 1980, p 13.

TABLE 39. Overall mortality rates of different breeds of cattle among different age groups.

Breeds	Male (month)			Female (month)		
	Birth-1	1-3	3-6	Birth-1	1-3	3-6
<u>Indigenous cows</u>						
Tharparkar	10.2	7.2	2.9	19.5	8.0	7.8
Sahiwal	9.8	4.5	2.7	16.3	8.4	4.1
Red Sindhi	9.2	5.1	2.2	15.8	6.9	4.7
<u>Crossbred cows</u>						
Karan Swiss	11.6	4.5	2.6	20.5	9.6	5.4
Holstein x Tharparkar	3.5	4.0	3.5	12.1	2.8	2.6
Brown Swiss x Tharparkar	5.1	3.2	3.0	12.2	5.4	0.0
Jersey x Tharparkar	0.9	2.4	0.0	4.0	1.2	0.0
<u>Buffalo</u>						
Murrah	16.3	7.0	6.2	27.7	17.2	5.7
						3.6
						24.8
						3.7

Source: NDRI Handbook (Production), 1980, pp 135-136

in-contact and the healthy animals and take necessary disease control measures.

MILKING

Pay attention to the following:

Milking should be done in clean area preferably in a separate milking byre.

Pre-milking routine such as washing of cows, feeding concentrate, bringing in milk pails, etc, should be done at regular intervals.

Wash the udder and teats with mild anti-septic lotion (e g, Savlon) and dry before milking. Wipe the teats and udder with a detergent dipped cloth after milking.

Milker should wash his hands with anti-septic lotion before each milking.

Milking should be done with full hands, quickly and completely, followed by stripping, if so required. Milking operation should be complete in 8-10 minutes.

Sick cows should be milked at the end to prevent spread of infection.

Dry off the animals 60-70 days before the date of calving.

FEEDING

Milk production should be primarily fodder based. Adopt a sound system of relay cropping so that green fodder/silage/hay is available round the year. Ensure:

Roughage is chaffed (but not too finely) before feeding.

When straw and green fodder are mixed for feeding, a good guiding rule is: 1 kg of straw with 4-5 kg of green fodder for each 100 kg body weight.

Grains used in concentrate are crushed; oil cakes should be flaky and crumbly.

Moisten the concentrate mixture before feeding and mix with dry fodder like straw.

Adequate provision of vitamins and minerals through the provision of green fodder, salt bricks and mineral mixture in the concentrate feed.

BREEDING

Observe the cow closely and keep record of its coming in heat, duration of heat, service, insemination, conception and calving, specifically:

Be on the look out for the first heat

after calving. If it is in the first month of lactation, avoid it. Heat manifested around two months of calving can be used for service/insemination.

Keep the animal under observation for 21 days after service/insemination.

Animals that do not get in calf within 90 days should be got examined by a veterinarian. Animals with poor reproductive performance should be removed.

Plan for 300 days of lactation and 60-90 days of dry period.

CARE OF PREGNANT COWS

Average gestation period of cows is 283 days and that of buffaloes 310 days. Observe the following:

Separate pregnant animals two months before calving for special attention.

About two-third of the foetal growth occurs in the last three months of pregnancy. The pregnant animals should be fed well during this period for proper development of the foetus and for the maintenance of mother in good health.

Two weeks earlier to calving remove the cow to a properly disinfected calving area.

About three days earlier to calving, give it light and laxative ration by increasing proportion of bran and adding gur(jaggery).

Care during calving: Process of calving takes about two hours. The cow should be watched from a safe distance during this period. Observe the following:

Tear open the foetal bag if not ruptured during the process of calving.

In case of wrong presentation of calf or any other complication, call the veterinary doctor.

After delivery, give the cow a bucketful of fresh tepid water followed by warm mash made from bran, cracked wheat, bajra, jaggery, common salt, ginger and mineral supplement. This will restore its vigour and help in cleansing.

After birth placenta is expelled in about six hours. Remove it immediately after expulsion so that the cow does not eat it. If the after birth is not expelled within 24 hours or so, seek the help of a veterinarian.

CARE OF THE CALF

Ensure the following:

Put two tight ligatures on the naval cord. Disinfect with tincture of iodine the cut between the ligatures.

Help the calf to rise and direct it to mother's teats, if so required. Feed the calf on colostrum. In case it is desired to wean it immediately after birth, the calf should be dried using a clean towel cloth and then feed it with the colostrum in a bucket using finger dipped in the colostrum to be suckled by the calf.

Scientific rearing of calf: A normal calf stands and starts sucking milk within 30 minutes of calving; weaker calves need some assistance. Pay attention to the following:

Feed colostrum as soon after birth as possible, but not later than four hours to get the maximum antibodies absorbed. It should be fed for the first 3-4 days at the rate of 1/10 of the body weight, preferably thrice a day.

Within two hours of first suckling the calf usually passes first faeces (meconium), eliminating the material accumulated in the digestive tract before birth. If this does not occur, enema with a tea-spoonful of soda bicarb in one litre of lukewarm water may be given.

From the 10th day onward calves may be fed with calf starter containing 16 to 18 per cent digestible crude protein. Calves raised on a limited milk feeding system must be encouraged to eat fodder and grain ration at an early age; but do not over-feed them.

The calf should be weaned from liquid feed as early as 30 days.

Feed green fodder from the 15th day onward. Provide fresh clean wholesome water ad lib.

Artificially milk fed calves usually develop a tendency to suckle on softer appendages of other calves and thus take lot of hair which results in formation of hair balls in the digestive system of the calves and thus indigestive problem. Applying a little salt to the mouth after milk feeding/putting cotton thread netting on the mouth/keeping calves in separate individual pens would help.

Do not add any antibiotic and vitamins to

colostrum and/or milk.

Calves should be kept in a separate stall from birth to two weeks after the liquid feeding has been stopped. The calf pens should be dry, clean and well ventilated.

Protect calves against extreme weather conditions, particularly during first two months.

Group calves according to their size and not according to their age.

Vaccinate calves as per schedule.

Dehorn around 4/5 days of age.

Control ticks and flies in calf pens by spraying malathion or copper sulphate solution.

CULLING

For profitable dairying cull animals which do not net some profit over their keeping. Review the position half yearly/yearly and cull those animals whose performance is economically unremunerative. Specifically, calves from parentage with low productivity, long calving intervals, late maturity and low longevity should go out. Male calves should be culled immediately after they are not needed.

DISPOSAL OF MANURE

Cattle dung and urine make valuable manure. The urine should be drained into collection pits and then to the fields through irrigation channels. Dung with other farm waste can be converted into compost under temperate climate conditions. Dung can be used for the production of biogas through gobar gas plant. Dung from 5 to 8 cows will be sufficient to feed 2.85 cubic metres (100 cubic feet) capacity plant which will produce enough gas to cook food for 7 to 9 persons a day.

Heat Detection in Dairy Animals

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FOR assured profits from dairy farming, at least three out of four cows must be in milk all the year round. To achieve this goal, early detection of heat, followed by timely insemination, is essential. It will also cut down the dry period of the herd. Heat occurs in dairy animals — both cows and buffaloes — at regular intervals of nearly 21 days.

The first signs of heat are manifested when the animals have attained puberty (physiological maturity), but heifers attain full reproductive capacity (sexual maturity) about six months thereafter depending on their age and bodyweight. The crossbred heifers may show signs of first heat as early as 9-10 months of age, but the appropriate time of breeding them is when they are between the age of 15 and 18 months and attain a bodyweight of about 275 kg. Similarly, for zebu (indigenous), the age is 24-36 months with about the same bodyweight and for buffaloes, 30 months with about 400 kg bodyweight.

. The length of inter-calving period would depend on the detection of heat as early as the female starts cycling after parturition. Normally, the cow's uterus returns to normal condition (involutes) within six to eight weeks after calving. If bred during this period, the chances of conception are slender and the risk of infecting the uterus is high. On the other hand, too delayed a breeding extends the dry period. Therefore, the cow should be bred on the occurrence of the first heat seen some 60 days after calving. This will ensure a calving interval of 12-13 months

on an average for crossbreds. In case of indigenous cattle and buffaloes, the animals start exhibiting oestrous soon after involution of uterus and thus have longer post-parturition oestrous interval. The inter-calving period is 15-18 months in indigenous cattle and 18-22 months in buffaloes.

It has been observed that the fertility rates in cattle during the months of February and March are usually higher as compared to summer months when "heat" symptoms may get depressed. Most of the buffaloes get bred from September to January/February. It has been reported that the sprinkling of water on buffaloes or making them wallow in water helps them to improve their fertility during summer months. Insemination during the cooler part of the day and protecting the inseminated animals from exposure to heat and direct solar radiation also helps in increased chances of conception in buffaloes. Bulls must also be similarly protected during summer months, otherwise they will lose libido and have poor semen quality.

The oestrous cycle in cows is generally of 12-18 hours duration (from the coming into heat and going out of heat). Prior to it, the cow exhibits first symptoms of heat. The 18-hour is the "standing" heat period when the cow allows the bull to mount. It is subdivided into two stages; early heat and midheat. This 18-hour period of "standing" heat is the critical period of insemination. The ovulation (the release of the egg) takes place in the late heat period. The best time to breed is the mid-

SYMPTOMS OF HEAT AT VARIOUS STAGES IN COWS & BUFFALOES

Symptoms at early stages of heat are not pronounced in cattle but they show activities like smelling other cows, attempting to mount on them and bellowing. They become restless and their vulva gets moist, red and slightly swollen. After a time lapse of six to eight hours the heat becomes more pronounced. The cow stands still to be mounted by other cows or bulls. Due to this, this period is termed as "standing heat". This extends for 12-18 hours and shows other symptoms like bellowing, nervousness, anorexia, reduction in milk yield, moist and red vulva and clear mucus discharge.

TABLE 40. Heat detection in cows.

Symptoms	Early heat (Mounting) 0-8 hrs	Mid-heat (Standing) 12-18 hrs	Late heat 24 hrs
Social behaviour	Restless, tries to get isolated from other cows	Mixes with other cows in the herd	Normal behaviour with other cows in the herd
Excitement	Shows sign	More pronounced	Absent; calm
Appetite	Depressed	More depressed	Normal
Bellowing	Sometimes	Frequent	Very seldom
Milk yield	Falls	Further falls	Starts increasing
Licking other animals	Moderate	High	Seldom
Rise of body temperature	Slight rise	Sharp rise	Comes back to normal
Mucus discharge from vulva	Clear, watery and copious; break while falling down from vulva and flows	Turbid, opaque or cloudy viscous and ropy; in reduced quantity; does not break while falling; rather hangs right from vulva down to the ground	Seldom seen
Vulva	Wrinkles on vulva lips start disappearing; lips starts swelling	Pronounced swelling	Swelling recedes
Vaginal Mucus discharge	Clear and ropy	Pronounced	Difficult to detect
Mounting other animals	Rarely seen	Frequently observed in the first half of mid heat	Seldom seen
Standing still when other cows or bulls try to mount	Sometimes seen	Very common during the second-half of the mid heat and indicate right time for insemination	Seldom seen
Urination	Frequent	More frequent	Normal
Uterine tone	Tight & turgid	Becomes more turgid	Comes down to moderate tone

heat period (from 10-24 hours after the start of the "standing" heat).

The egg, after its release, must get fertilized within five to ten hours, while sperms have a longer life and may survive in the genital tract for a day or two.

Therefore, the time of insemination is important for effecting fertilization. If the mating is too early during the heat, the sperms may not live long enough to fertilize the egg, which is generally ready for fertilization about 24 hours

TABLE 41. Heat detection in buffaloes.

Appetite	Normal	Depressed	Normal
Excitement	Very much	Less excited	Does not show normal
Bellowing	Occasional	Frequent	Absent
Swollen vulva	Slight	Moderate	Absent
Frequency of urination within 30 minutes	Occasional to two times	More frequent	Less frequent
Uterine tone	Intense (tight & turgid)	More intense (tight & turgid)	Moderate
Opening of cervix	Partial or fully open	Fully open	Almost closed
Mounting by teaser bull	Present (70% cases)	Present (90% cases)	Present (40% cases)

after the onset of heat. If too late, the egg is likely to die before the sperm can approach to fertilize it. In either case, the animal will not conceive, and the dry period gets prolonged. Generally speaking, the best time for breeding in cattle is soon after the middle of the heat period. If inseminated during the mid-heat or the end of the mid-heat period, the sperm

will be able to reach the reproductive tract (fallopian tubes) and fertilize the egg on its arrival.

As a rule of thumb, the animal that comes into heat during early morning should be inseminated in the evening; if around noon, early next morning, and if during evening hours then late next morning.

TABLE 42. Performance of artificial insemination (AI) in 1985-86, statewide.

State/Institution	No of AI Centres	No of AIs Performed ('000)			Calving percentage
		Cows	Buffaloes	Total	
Andhra Pradesh	2,600	-	-	1,000	25
Gujarat	NA	134	680	814	NA
Karnataka	610	-	-	899	20
Maharashtra	2,734	557	159	716	24.39
Orissa	1,370	-	-	195	NA
Punjab	570	640	179	819	NA
West Bengal	1,936	-	-	565	NA
AICRP on Cattle*	5	-	-	4	41.47
BAIF, Pune	212	-	-	149	68.97
IDC (Operation Flood)**	8,581	957	873	1,830	19.6
Indo-Swiss Project, Kerala***	1,376	-	-	1,296	37

NA: Not Available

*1984-85

**1985-86(Provisional)

***1986-87

Source: State Departments of Animal Husbandry, etc.

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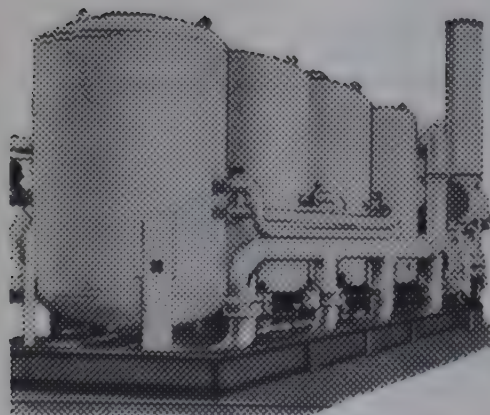
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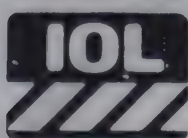


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India has not only the largest population of cattle and buffaloes but also the world's best breeds of dairy buffaloes and drought cattle. Further, they have adapted to tropical heat and resistant to most of the tropical diseases.

Cattle Breeds in India

LIVESTOCK husbandry has been practised in India from very ancient times, and selection of animals for higher productivity was a specialized subject even from the days of Mataya Purana, which gives instructions regarding the selection of a bull. Such a long association with the art of rearing of animals and the widely varying agro-ecological conditions of the country and origin of the livestock, has resulted in great deal of diversity in livestock genetic resources over the years. Over time, however, there has been deterioration in the quality of livestock, especially because of increase in number without commensurate increase in feed resources and organizations to undertake systematic genetic improvement.

India has the largest cattle and buffalo population. The country has also the world's best breeds of dairy buffaloes and drought cattle. Further, these livestock have adaptation to tropical heat and resistance to most of the tropical diseases, when compared to those from temperate regions. There exist in this country most of the domesticated species of livestock, and a number of rare species, viz, yak, mithun and wild buffaloes (arni), the ancestors of the modern day buffaloes.

In spite of such a large number of breeds, the majority of the livestock is non-descript. There is a large intermixture among breeds in regions where two or more breeds exist.

Most of the breeds of livestock that exist today have evolved through natural selection for adaptation to the agro-

ecological conditions. Only to a very limited extent there has been artificial selection based on the social and economic needs of the breeders. Most of the indigenous breeds are very well adapted to harsh climate, long migration, poor nutrition and scanty drinking water. In recent years, attempts have been made to introduce superior exotic inheritance into indigenous breeds through crossbreeding. A few superior breeds/strains from such crossbred base have been evolved in cattle — Karan-Swiss, Karan-Fries and Sunandini. Their productive performance is superior to those of indigenous breeds. Besides, they have shown reasonable adaptation to tropical heat and diseases.

CATTLE

Origin and domestication: The indigenous (zebu) cattle (Bos indicus linn.) differ from Bos taurus found in Europe and North America in body conformation. The zebu is characterized by a prominent hump, a long face, upright horns, drooping ears, a dewlap and slender legs. The colour varies from white to grey and black. Zebus have relatively lower basal metabolic rate, better capacity for heat dissipation through cutaneous evaporation and thus adaptation to tropical heat, and resistance to diseases specially the tick-borne diseases than taurus cattle. Zebu cattle, primarily Ongole, Gir and Tharparkar, have been used in subtemperate/subtropical regions, e g southern United States, South America and Australia for developing tropically adapted dairy/beef cattle breeds.

The domestication of zebu cattle

appears to have taken place in Afghanistan, Sind and Baluchistan before 4000 BC. The seals from Sivikotada in Gujarat and Kalibhangan in Rajasthan bear images of animals favourite to Harappans (2200 BC to 1600 BC), and were found in Sind, Gujarat and Rajasthan. These figures resemble Bos primigenius or Aurochs from Pleistocene onwards found in Europe, North Africa, Egypt, Palestine, Mesopotamia, Iran and Baluchistan. In Siwaliks occur fossils of Bos acutifrons, regarded as the possible ancestor of the Pleistocene wild cattle, i.e. Bos nomadicus of India and Bos primigenius of Europe.

Classification and description: Perhaps, Oliver (1938) was the first to survey the important breeds of cattle in India. He indicated that there are four to five basic types, and that a large proportion of the breeds are the result of interbreeding between two or more types. These types are: (i) large white cattle of North, (ii) the very distinct Mysore type of South with characteristic formation of head and horns, (iii) the highly peculiar cattle of Kathiawar and the western part of India, and (iv) the small black, red or dun cattle met from North to South and East to West of India mainly hilly tracts and forests. Dhanni cattle of Punjab (now in Pakistan) which resemble Afghan cattle were possibly brought into this country by the waves of immigrants through the northern passes. These could have formed the basis for Sahiwal with possible admixture of Gir.

Grey-white cattle, of which there are a number of breeds mainly in the North but with some influence in the South as far as Mysore (now Karnataka), have two main divisions:

(i) The broad-faced lyre-horned grey-white cattle of western India. Kankrej is a more representative breed and appears to have followed the route taken by Rig Vedic Aryans after entering India through northern passes, turned west, north of Aravali range to reach Sind, Gujarat and Southern Rajasthan. These are related to bulls depicted in Mohenjo Daro seals;

(ii) The white narrow-faced, stumpy-horned breeds, e.g. Haryana, Rath, Gaolao and Ongole. These are located along the route taken by the Rig Vedic Aryans from northern passes through central India to the South.

The cattle in India vary in size and body conformation, perhaps due to their origin, adaptation to different agro-ecological conditions and the use to which they have been put to in different parts of the country. The best Indian dairy, draught and dual-purpose cattle breeds are found mostly in north-western region. Some good draught breeds do exist in southern peninsular region. The breeds of north-western region, viz Red Sindhi, Sahiwal and Tharparkar, have their home tract in Pakistan. Our country has now only a small population mostly located at a few organized herds. There is an immediate need for conservation and multiplication of these breeds. The 26 breeds of Indian Cattle can be classified as milch breeds, draught breeds and dual-purpose breeds, as follows:

Milch Breeds: Gir, Sahiwal, Red Sindhi and Tharparkar.

Draught Breeds: Nagori, Rachaur, Kankatha, Malvi, Kherigarh, Hallikar, Amritmahal, Khillari, Bargur, Kangayam, Panwar, Siri, Gaolao and Krishna Valley.

Dual-purpose Breeds: Nimari, Dangi, Haryana, Mewati (Kosi), Rath, Ongole, Kankrej and Deoni.

Developmental activity for improvement of indigenous breeds: The major emphasis in cattle breeding till near past was mainly on the production of bullocks capable of supplying the motive power for agricultural operations. The Government cattle farm at Hissar, which was set up in 1809 for breeding camels for the army, later from 1853 was used for breeding bullocks for artillery and has been an important source of Haryana bulls. Haryana has made the largest impact on cattle in the Indo-Gangetic plains, extending from its home tract in Haryana and Punjab to West Bengal, as it has been extensively used for grading up local breeds for improving draught and milch. Indian cattle breeds, especially Ongole, Gir and Tharparkar, have been used for breeding subtemperate breeds of beef cattle. Similarly, Red Sindhi and Sahiwal have been used as improver breeds for milk in developing tropicalized dairy breeds through crossing them with European dairy breeds. These may gain further importance if we eradicate some diseases as rinderpest and foot-and-mouth disease or create disease-free zones from where frozen semen or frozen embryos could be exported.

There have been some attempts to improve the important indigenous breeds, especially

for milk, through selection of bulls on the basis of dams' milk yield and to a limited extent on their progeny performance. There is a need for proper organization for undertaking systematic breeding, recording of performance data on private cattle and their use in progeny testing of bulls. The organized farmers being too few and small in size cannot afford proper accuracy and intensity of selection. In the eastern parts of the country and in the coastal areas, the animals are generally non-descript and are poor in draught capacity as well as milk production.

During the recent years with the increase in human population, efforts were diverted to improve milk production through selection within superior indigenous breeds, grading up of the poor producers with superior indigenous breeds or crossing them with superior exotic dairy breeds. Holstein, Jersey and Brown Swiss are the major exotic dairy breeds which are being used for this purpose.

Herd books are being maintained since 1941 for important breeds of cattle, both with the individual farmers and organized State/Central Government farms. These herd books serve as authoritative guides on the standard breeds and their respective milk yield in the country. The breeds so far included in the herd books and their required minimum milk yields are: Murrah, 1,362 kg; Sahiwal, 1,362 kg; Red Sindhi, 1,135 kg; Tharparkar, 1,135 kg; Hariana, 908 kg; Gir, 908 kg; Kankrej, 681 kg; Ongole, 681 kg; and Kangayam, 454 kg.

BUFFALOES

Origin and domestication: Indian buffalo is the lineal descendent of Bubalus palaeindicus of Pliocene. There are three distinct species of buffaloes in Asia, the anoa of Celebes, the tamarao of Mindoro and the arni (the wild buffalo) of India. Only the last one has been domesticated. The Indian water-buffalo, Bubalus arnee, receives its specific name from the Hindi word arni. Sind valley was one of the centres of domestication of buffaloes in India. It appears that buffaloes were also domesticated during the Harappan period (2200 BC to 1600 BC).

Classification and description: The domesticated buffaloes are classified into two main categories, viz the swamp buffalo and the river buffalo. They belong to the same species but have very different habits. The

swamp buffalo is more or less a permanent denizen of marshy lands, where it wallows in mud, and feeds on coarse marsh grass. It is found principally in parts of Assam and Tamil Nadu in India. This type comprises Nagpuri/Pandurpuri, Toda and Marathwara. The river buffaloes are found throughout India where clean water of rivers, irrigation canals and ponds is available to wallow. This type was specially developed for milk production with high fat percentage. It is docile. Important breeds of milch buffalo, viz Murrah, Nili-Ravi, Surti, Mehsana, Jaffarabadi and Bhadawari, are from this group.

Developmental activity for improvement of indigenous breeds: Indian buffaloes account for nearly 51 per cent of the world population. Their population in this country is less than one-third of that of cattle, but they contribute 59 per cent of the total milk produced. Buffalo milk has higher butter-fat and solids-not-fat contents than cow milk. The Indian buffalo, on an average, yields 500 kg of milk in a lactation as against 187 kg by indigenous cows. Buffaloes with a lactation yield of 1,362 to 1,850 kg are common; individuals with 4,000 kg of milk yield are observed quite often.

In spite of the importance of buffalo as dairy animal it has not received due attention in the improvement programme. The major limitation has been in the selection of genetically superior bulls as there are only a few small organized farms taking up progeny testing of bulls. This allows only a limited accuracy and intensity of selection. Further still, difficulties exist in obtaining good quality semen throughout the year and freezing of buffalo semen. Murrah has been used as the major improver breed for grading low-milk-producing breeds throughout the country and in a number of other countries of Asia and Europe. Breeds like Mehsana and Godavari have been developed through grading of Surti and non-descript buffaloes with Murrah in Gujarat and coastal Andhra Pradesh respectively.

Murrah and Nili-Ravi are the best dairy buffalo breeds in India. Nili-Ravi has its home tract in Pakistan and only a small number of these animals are found in the districts of Punjab bordering Pakistan. This breed deserves immediate steps for conservation and further improvement. Indian breeds of cattle and buffaloes are presented in the following pages.

TABLE 43. Recognised Indian Breeds of Cattle -- Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
AMRITMAHAL	Karnataka	M 498.9	1.3	1.5	1.9	Body compact, forehead prominent with a furrow in the middle; horns emerge from the top of the poll and extend backwards on each side of the neck, turning upwards and ending in sharp points; ears small and fine; dewlap and hump well developed; skin fine with glossy fine hair.	Shades of grey varying from white to nearly black. In some cases white or grey markings of a definite pattern present on the face and dewlap.
		F 317.5	1.3	1.3	1.7		
BACHAUR	Sitamarhi Distt of Bihar	M 385.5	1.4	1.2	1.8	Body compact, back straight, barrel well rounded; forehead broad and flat, eyes prominent and large; ears medium sized and drooping; hump compact, firm and medium sized; tail short.	Grey
		F 317.5	1.0	1.2	1.7		
BARGUR	Coimbatore Dist of Tamil Nadu	M 340.0	1.2	1.4	1.8	Body samller but compact, forehead not prominent, horns grow backwards and upwards; hump moderately sized; dewlap fine but well mashed; tail rather short.	Usually red and white. Sometimes light grey.
		F 295.0	1.0	1.3	1.7		
DANGI	Maharashtra, Gujarat	M 362.9	1.3	1.4	1.5	Medium sized body, skin oily; small head, projecting forehead, horns short and thick; ears small.	Red and white or black and white.
		F -	-	-	-		
DEONI	Andhra Pradesh, Karnataka Maharashtra	M 589.7	1.5	1.7	2.0	Medium sized, forehead, less pronounced, well developed dewlap and sheath; horns take characteristic outward and backward curve, ears pendulous but short without the notch near the tip.	Black and white or red and white with irregular patches and spots.
		F 340.2	1.3	1.5	1.7		

TABLE 43. (contd) Recognised Indian Breeds of Cattle — Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
GAOLAO	Madhya Pradesh Maharashtra	M 431.0	1.5	1.2	1.9	Body medium sized, light head usually long and narrow, somewhat broader at the base of horns; forehead usually flat; eyes almond shaped; ears of medium size; horns stumpy and short; dewlap voluminous; tail comparatively short.	White or light grey.
		F 340.2	1.3	1.3	1.7		
GIR	Gujarat	M 544.0	1.4	1.5	1.8	Well proportioned body; prominent and broad forehead, curved horns turning back at the tip; long and pendulous; ears long and whip-like tail; hip bones prominent.	Varies from shades of red and white to almost black and white or entire red.
		F 385.5	1.3	1.7	1.7		
HALLIKAR	Karnataka	M 453.5	1.4	1.5	1.9	Medium sized compact and muscular in appearance; forehead prominent, usually furrowed in the middle, ears short and sharp, horns long and pointed curving back-wards; hump short; dewlap moderately developed, back straight and strong; skin fine with a coat of glossy hair; tail fine.	Grey to dark; grey with deep shadings on fore and hind quarters.
HARIANA	Haryana, Punjab, Rajasthan, Uttar Pradesh	M 499.0	1.4	1.5	2.0	Body proportionate, moderately long, compact in appearance; head carried high; horns short; curving upwards and inwards; eyes large and bright; ears small and slightly pendulous; dewlap small large hump in males, short thin and tapering tail, well developed udder in cows.	White or light grey.
		F -	-	-	-		

TABLE 43. (contd) Recognised Indian Breeds of Cattle — Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
KANGAYAM	Tamil Nadu	M 317.5	1.4	1.0	1.9	Moderately long body; straight back; short neck and strong dewlap; small moderately sized head; slightly prominent forehead; wide muzzle; horns strong curving upwards and outwards and slightly inwards; ears small and pointed; tail of moderate length.	Usually grey or white.
		F 294.8	1.4	1.4	1.7		
KANKREJ	Gujarat	M 589.6	1.6	1.6	2.0	Heaviest of Indian breeds, powerful body, broad chest, straight back, hump well developed; thick skin, dewlap moderately developed, forehead comparatively broad, slightly dished in the centre, face short slightly upturned nose, tail of moderate length with black switch.	Silver grey to iron grey or steel black.
		F 430.9	1.3	1.4	1.8		
KENKATHA	Uttar Pradesh	M 344.5	1.3	1.2	1.8	Body short, deep and compact, back straight; head short and broad forehead dished; feet good and hard; dewlap medium sized, horns strong and pointed outwards, ears sharply pointed and drooping; hump well developed, tail of medium length.	Grey on barrel varying to dark grey on the rest of the body.
KHERIGARH	Uttar Pradesh	M 476.0	1.3	1.2	1.8	Face small and narrow; horns thin and upstanding; eyes bright; ears small; hump well developed in bulls; dewlap thin and pendulous; tail long.	White
		F 317.5	1.3	1.3	1.5		
KHILLARI	Maharashtra	M 499.0	1.4	1.4	2.0	Body compact and tight skinned; forehead slightly prominent; head massive; horns long and sweeping emerging close to each other at top of poll upwards, humps well developed, eyes set in elongated fashion; ears small, pointed, dewlap voluminous; tail comparatively short.	Grey white.
		F 344.0	1.3	1.1	1.7		

TABLE 43. (contd) Recognised Indian Breeds Cattle -- Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
KRISHNA VALLEY	Maharashtra, Andhra Pradesh, Karnataka	M 499.0	1.5	1.5	1.9	Body long and massive, chest deep and broad; head comparatively small with a slightly bulging forehead; horns small and curved usually emerging onwards; and slightly curved up inwards; dewlap moderately developed; ears small and pointed.	Grey white.
		F 340.2	1.2	1.3	1.5		
MALVI	Madhya Pradesh, Rajasthan	M 499.0	1.4	1.5	2.0	Body deep, short and compact, back straight, hind quarters dropping; dewlap well developed; head short and broad, with dishd forehead; muzzle marked; horns pointed, emerging from outer angles; ears short and pointed and not dropping; tail of moderate length.	Grey, deepening in the mature male to a dark iron grey almost black on the neck, shoulders, hump, fore and hind quarters.
		F 340.2	1.3	1.4	1.7		
MEWATI (KOSI)	Rajasthan	M 385.6	1.6	1.8	1.9	Long deep and powerful frame, face long and narrow, forehead bulging, horns emerge from outward angles; eyes prominent; ears pendulous; hump well developed, tail long.	White
		F 326.6	1.2	1.3	1.6		
NAGORI	Rajasthan	M 408.0	1.5	1.5	2.0	Body long, deep, powerful with straight back and well developed forehead, hind quarters, ears large and pendulous, hump moderately developed, dewlap small and fine, face narrow and rather long; forehead flat, horns moderately developed, emerging from outer angles of poll in outward direction and carried upwards with a gentled curve to turn at points; tail of moderate length.	Generally white or grey.
		F 340.0	1.4	1.3	1.9		

TABLE 43. (contd) Recognised Indian Breeds of Cattle — Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
NIMARI	Madhya Pradesh	M 390.0	1.6	1.8	1.8	Well proportioned and compact body; head moderately long with a somewhat bulging forehead; horns emerge in a backward direction; body large, straight back; moderately developed dewlap; hump well developed; fine skin and slightly loose.	
		F 317.5	1.4	1.3	1.6		
ONGOLE	Andhra Pradesh	M 567.6	1.5	1.6	2.0	Large sized animal with loosely knit frame; long body, limbs long and muscular; forehead broad between eyes; ears long; horns stumpy; dewlap large and fleshy; hump in males well developed and erect.	White, dark grey markings on head.
		F 431.0	1.3	1.1	1.8		
PONNWAR		M 317.5	1.4	1.4	1.6	Small narrow face, small ears; big and bright eyes; humps well developed, horns long and up-standing; tail long and tapering.	Generally black and white.
		F 294.8	1.3	1.3	1.6		
RATHI	Rajasthan	M 385.5	1.5	1.5	2.0	Medium sized powerful cattle; well built. Deep chest; face straight; forehead flat; eyes wide and large; ears short and pendulous; horns small and emerge laterally; hump moderately developed. Dewlap light; fore and hind quarters well developed, tail short with black switch.	White, dark grey markings on head.
		F 326.6	1.2	1.4	1.5		
RED SINDHI	Pakistan; also available in organised farms in Haryana, Tamil Nadu and other parts of India.	M 454.0	1.3	1.4	1.8	Medium sized. Well proportioned compact animal; heavy hump, dewlap and sheath; horns thick at the base, emerge laterally and curve upwards, ears medium sized and drooping, udder capacious.	Red, shades varying from dark red to dim yellow.
		F 317.0	1.2	1.4	1.4		

TABLE 43. (contd) Recognised Indian Breeds of Cattle -- Home tract and averages of important conformation traits of.

Breed	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
SAHIWAL	Pakistan; also available in organised farms in Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal	M 544.0	1.7	1.5	1.9	Long, deep, fleshy, symmetrical body with short legs, loose skin, broad forehead, horns stumpy; medium sized ears; dewlap heavy and large hump straight, hip bones, high and wide apart; tail long and whip-like, udder capacious.	Usually reddish brown with or without white splashes.
		F 408.3	1.3	1.4	1.7		
SIRI	Sikkim	M 453.5	1.3	1.5	1.9	Small and square cut head; forehead wide and flat, horns sharp and directed forwards and slightly upwards; ears small; hump slightly forward.	Black and white or solid black.
		F 362.9	1.2	1.3	1.8		
THARPARKAR	Pakistan; also in Gujarat, Rajasthan	M 544.3	1.3	1.4	1.9	Deep, strongly built, medium sized well proportioned body, limbs short, straight and strong; joints firm, face moderately long with comparatively broad poll, head of medium size; forehead broad and flat or slightly convex above eyes full and bright; ears somewhat long; broad and semi-pendulous; medium sized horns; fore and hind quarters somewhat drooping, tail fine with black switch reaching to fetlocks, good and capacious udder.	White or grey
		F 340.2	1.2	1.3	1.5		

TABLE 44. Recognised Indian Breeds of Buffaloes — Home tract and averages of important conformation traits of.

Breeds	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
BHADAWARI	Madhya Pradesh, Uttar Pradesh	M 476.3	1.3	1.4	1.9	Medium sized, body small; wedge shaped head; short and stout legs; hoofs black; hind quarters heavier and higher than forequarters, scanty hair on the body; long and thin tail with black end white or white, switch reaching to hocks.	Copper.
		F 385.5	1.3	1.4	1.8		
JAFFARABADI	Gujarat	M 590.0	1.5	1.7	1.7	Long body but not compact, dewlap in female somewhat loose, head and neck massive; forehead very prominent, horns heavy, incline to droop on each side of neck, less tightly curved than in Murrah; udder well developed.	Usually black.
		F 454.0	1.4	1.7	1.9		
MAHSANA	Gujarat	M 569.0	1.5	1.8	2.1	Body longer than Murrah; lighter limbs; longer and heavier head; horns usually less curved at the end; longer wall shaped udder.	Black or fawn grey with white markings on face, legs or tail tip.
		F 431.0	1.4	1.6	2.1		
MURRAH	Haryana, Delhi, Uttar Pradesh, Punjab	M 567.0	1.5	1.5	2.3	Body massive; head comparatively light; horns short and tightly curved; well developed udder; hips broad; fore and hind quarters drooping; tail long, reaching to fetlocks.	Jet black with white marking on tail, face and extremities.
		F 431.0	1.4	1.5	2.2		
NAGPURI OR ELLICHPURI	Maharashtra, Andhra Pradesh	M 522.0	1.4	1.8	2.1	Long horns, flat and curved, face long and thin, neck somewhat long, limbs lighter, tail comparatively short, reaching below hocks.	Usually black sometimes white, white patches on face, legs and tail tip.
		F 408.0	1.3	1.5	2.0		

TABLE 44. (Contd) Recognised Indian Breeds of Buffaloes -- Home tract and averages of important conformation traits of.

Breeds	Home Tract	Weight (kg)	Body Measurements (Metres)			Distinguishing Features	Colour
			Height	Length	Girth		
NILI-RAVI	Pakistan, Punjab	M 567.0	1.4	1.6	2.3	Head elongated, bulging at the top, depressed between eyes, muzzle fine, frame medium sized; horns small coiled lightly, neck long, thin and fine, udder well developed tail long almost touching the ground.	Usually black with white markings on forehead, face, muzzle and legs.
		F 454.0	1.4	1.5	2.3		
SURT I	Gujarat	M 499.0	1.3	1.4	1.9	Well shaped medium sized body with wedge shaped barrel; long and broad head, rounded between horns; back straight; eyes prominent; horns sickle shaped, moderately long and flat; tail fairly long, ending in a white tuft.	Black or brown; two white collars round the jaw and the other at brisket.
		F 408.0	1.3	1.4	1.8		

TABLE 45. Reproduction and production traits in Indian buffaloes.

Breed	Age at first calving (months)	Calving interval (days)	Lactation yield (kg)	Lactation period (days)
Bhadwari	50.7±0.8	453.6±10.2	1,111.0±12.9	276.0±2.2
Marathwada	55.2±0.9	429.9±7.4	960.0±38.0	270.0±6.5
Murrah	41.3±1.4	495.1±12.2	1,744.0±103.5	279.0±6.5
Murrah	42.4±0.1	479.5±2.4	1,597.3±8.0	295.9±1.0
Nili	53.2±0.6	461.6±18.8	1,855.2±106.3	316.0±8.5
Surti	44.5±2.0	461.1±15.3	1,772.0±10.3	350.1±5.4
Non-descript	49.5±0.8	481.0±18.4	541.0±39.9	272.3±8.5

Source: Animal Genetic Resources in India, NDRI, 1981, p 29.

TABLE 46. Reproduction and production parameters in Indian cattle and crossbreds.

Breed	Age at first calving (months)	Service period	Calving interval (months)	Lactation yield (kg)	Lactation length (days)	Dry period (days)	Milk yield/day of calving interval (kg)
Indian breeds							
Dangi	53.6+2.0	229.0+6.9	17.0+0.6	615.9+34.9	292.5+11.5	221.3+16.8	1.2
Deogir	46.9+2.1	181.0+9.0	15.4+0.4	1,423.1+60.5	313.2+08.7	157.0+08.4	3.1
Deoni	52.9+1.0	163.6+6.5	14.8+0.3	879.2+23.6	270.0+04.6	172.6+07.4	2.0
Gir	47.0+0.8	160.6+4.4	15.7+0.5	1,403.0+31.1	257.4+04.6	213.6+05.1	2.9
Gaolao	46.2+0.4	188.3+4.8	15.6+0.3	534.5+15.2	295.2+05.2	185.2+07.6	1.3
Hallikar	45.1+1.5	298.3+7.5	19.7+0.9	541.9+61.1	285.1+10.1	302.0+28.5	0.9
Hariana	58.7+0.4	166.9+0.5	19.5+0.5	1,136.7+34.0	232.5+04.3	166.9+08.0	1.9
Kangayam	44.1+0.4	225.0+5.9	16.7+0.3	643.6+10.5	212.0+30.0	242.0+06.9	1.3
Kankrej	47.4+0.8	212.0+6.1	16.2+0.4	1,850.0+51.4	351.0+08.0	141.0+09.2	3.8
Khilari	51.5+1.1	175.0+4.0	15.2+0.2	214.7+12.2	255.0+03.1	242.7+06.7	1.0
Ongole	39.9+0.4	229.3+5.2	17.0+0.6	613.1+60.5	217.0+08.9	366.2+23.7	1.2
Rathi	40.1+0.4	256.1+8.3	19.3+0.7	1,931.0+53.0	331.0+04.2	243.0+06.2	3.3
Red Sindhi	41.7+0.6	146.8+5.1	14.7+0.3	1,605.0+24.7	284.0+02.4	146.8+05.1	3.7
Sahiwal	40.2+0.2	156.0+3.2	15.0+0.6	1,718.7+36.0	283.5+01.8	156.0+03.2	3.8
Tharparkar	49.4+0.4	145.5+8.3	14.8+0.8	1,659.2+53.3	280.1+06.0	145.5+08.3	3.7
Umblachery	45.6+1.1	202.0+8.9	16.1+0.5	323.9+18.5	233.7+09.1	277.9+15.8	0.7
Non-descript	59.0+2.5	280.0+8.6	18.7+1.0	534.7+14.3	303.0+06.2	264.0+20.3	0.9
Non-descript	54.0+2.0	295.2+9.2	19.6+0.9	492.3+11.6	268.6+04.0	300.8+26.1	0.9
Cross-bred cattle (Bos Indicus F x Bos Taurus M)							
H x F	33.0+1.1	173.0+15.3	15.3+0.8	3,195.5+205.0	340.0+05.1	85.0+15.4	7.0
H x BS	29.0+0.9	134.0+12.0	14.1+0.6	2,785.5+163.2	336.0+24.5	115.0+23.2	6.6
H x J	32.9+1.2	134.0+10.7	13.5+0.4	2,868.0+215.5	308.0+04.2	98.0+05.2	7.1
G x J	24.9+1.8	101.0+10.8	12.7+0.9	2,713.0+225.5	324.0+06.2	57.0+06.3	7.1
G x F	34.9+0.5	113.3+11.6	13.2+0.3	2,254.5+097.5	288.2+06.0	105.9+16.3	5.7
RS x F	29.2+0.6	90.0+10.8	12.2+0.4	2,326.2+094.3	283.8+08.3	84.1+18.2	6.3
RS x RD	28.3+1.2	71.0+10.3	11.7+0.3	2,213.8+115.5	267.0+09.4	85.0+17.0	6.2
RS x J	29.0+0.9	109.6+09.9	13.6+0.5	1,501.7+082.3	305.8+07.2	98.4+12.8	3.7
R x J	31.3+1.2	104.0+11.2	12.6+0.5	2,801.6+096.4	321.0+08.4	60.0+11.9	7.4
T x F	33.6+0.6	119.8+12.4	13.2+0.4	2,600.0+049.5	311.1+17.8	96.2+17.7	6.6
S x F	33.6+0.8	133.6+11.5	13.7+0.4	2,356.8+020.0	294.6+05.1	121.8+12.4	5.7
S x J	32.6+0.6	120.0+15.4	13.3+0.6	2,659.7+029.0	314.0+16.8	92.0+06.3	6.7
J x BS	34.5+5.1	147.2+77.3	14.4+2.9	2,188.0+607.0	292.0+12.9	141.3+18.8	5.0
L x J	31.0+3.5	218.2+17.9	17.7+0.8	1,151.0+045.0	328.6+04.0	109.3+23.2	3.7

H = Hariana, S = Sahiwal, RS = Red Sindhi, G = Gir, T = Tharparkar, L = Non-descript, R = Rathi, F = Friesian, BS = Brown Swiss, RD = Red Dane and J = Jersey. Source: Animal Genetic Resources in India, NDRI, 1981, pp 28,30.

India's present milk output could be doubled if dairy animals were only adequately fed. Some of the ways and means of achieving this objective are discussed here.

Scientific Feeding of Dairy Animals

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OF all the livestock, dairy animal is known as one of the most efficient producers of food for man. It can utilize large quantities of feed, much of which is inedible in the natural state. The economical production of milk, however, depends largely upon three general factors -- the efficiency of an animal, its nutrition, and managerial care. The efficient cow/buffalo is the result of inheritance and improved breeding. Its productivity, however, depends upon the adequate inputs in terms of feed and care available to that animal.

Where dairy animals are kept under required management conditions, more than half of the total expense goes for feed, while the remainder represents housing, labour, depreciation, interest and other miscellaneous items. The labour and other items are practically the same regardless of the total milk production. Therefore, by increasing the level of milk production of a cow or buffalo, the profit per unit of milk produced is increased. Although high-producing animals consume more feed than low-producing ones, the increased milk they produce pays more than the cost of additional feed. This occurs because a portion of the total feed input is required to maintain the cow at constant body weight regardless of its level of production. Therefore, a farmer should ensure that his animals get the proper feed for full exploitation of their production potential. Otherwise, their milk producing ability will be affected if they are not fed enough at the time they need.

In India, a large number of feed ingredients of variable chemical composition and digestibility from agriculture, forest, marine and industrial sources is utilized as animal feeds. Good quality forage and concentrates (primarily maize and oilcakes) are not usually available to animals. Thus, scientific and judicious combinations of various available feed ingredients to produce balanced ration for meeting the energy, protein, mineral and vitamin requirements of dairy animals for maintenance, growth and milk production have a greater significance under the existing situation.

MILK PRODUCTION PATTERN

Producing and supplying feed and fodder for dairy cows/buffaloes is the farmer's important job. It is also the quickest and cheapest way of improving his income. India's present milk output could be doubled if dairy animals were only adequately fed. Some of the ways and means of achieving this objective are discussed. At the outset, it is useful to consider the normal milk production pattern of well-fed and well-managed animals. This is independent of particular feeds used for the purpose.

The production pattern is simply the picture of the yield over one whole lactation period and is called the lactation curve. These patterns are useful for comparing performance under several different feed and management systems. They help in checking a feed programme for its relative strength and weakness. The lactation curve is obtained by

plotting the production in litres of milk at regular intervals, say weekly, from calving to drying off.

This particular lactation curve represents the production pattern of a group of cows that produce, say, about 3,000 litres each over 300 days of lactation. Its three main characteristics are:

- (i) The starting yield is 15 litres or more a day;
- (ii) The yield increases for about two months so that a peak of 30 litres or more is reached;
- (iii) The rest of the curve for the remaining eight months displays a steady decline in yield as the lactation proceeds. This decline in yield occurs at about 10 per cent per month. Hence, the yield in any one month is about 90 per cent of the yield in the previous month.

There are a number of ways in which the 300-day yield can be reduced. The curve has only to be broken or interrupted or bent downwards at any time during the lactation for a lower yield to be achieved. An inadequate feed supply is the most common factor causing such a variation in the production pattern.

With growing or fattening animals, the level of feeding employed at one time is not likely to exert a detrimental influence on animal response at a later date. In milk production, however, a wrong decision in feeding at one stage in lactation usually results in irreparable damage for the remainder of that lactation. Therefore, dairy cows and buffaloes should be fed to maximum production within the limits imposed by inherited capacity to produce. If unusual economic conditions are encountered which indicate feeding for some thing less than maximum production, the long term consequences of these should be kept in view, because once a lactation curve is permitted to decline, it cannot be revived back fully later during that lactation.

Good Starting Yield: The starting yield can be best considered as the average yield per day over the first month of lactation. For example, the average daily yield for the herd over the first vital month is 10 litres of milk per day or less, then it can be confidently expected that the maximum

average output will not exceed 2,000 litres of milk per cow. Likewise it can be said that a yield of 3,000 litres of milk will not be possible unless the starting milk yield exceeds 15 litres a day.

These production ceiling will not be reached unless the animal remains in good health for the remaining eight months of lactation, is fed adequately over this period, and is milked and handled competently in the shed. If average yield per cow/buffalo is to be raised, then the first assault must be directed at improving the performance of the cows at the beginning of their lactations.

What Determines Starting Yield? The importance of good yield at the commencement of the lactation cannot be over-emphasised. If one assumes that the animals are healthy, then the three main factors involved are:

- (i) The animal must be in adequate physical condition at the time of calving;
- (ii) The shed routines for milk removal from the animal must be efficient;
- (iii) The ration after calving must contain adequate amounts of energy and protein.

The PHYSICAL CONDITION of the dairy animal at calving time is determined by her nutritional treatment while she was dry. A dry cow is often considered as 'one which is not 'in profit'', whereas she should really be considered as a cow 'preparing for profit'. The amount of the profit depends on the thoroughness of the preparation. In a herd that is well managed, the dry cow is given a high priority rating for feed not less than that of the recently-calved cows. The cows before calving must be provided with the adequate body reserves that will be needed for good milk production after calving. She must be on a "challenge" feeding for the last two months of pregnancy.

The dry cow in the last two months of her pregnancy has an energy requirement equal to that of an empty cow producing about 10 litres of milk a day. Peak milk production under this programme will occur at about 30 days after calving. Research shows that earlier a cow is made to peak production, the more total milk she will produce during that lactation. Many cows that reach higher than normal maximum production levels maintain this production advantage throughout their lactation.

Thus, the requirement of a good milk yield over the first month is an ADEQUATE DAILY INTAKE OF ENERGY AND PROTEIN AFTER CALVING. This is possible only if the cows are being stall fed or group fed in a dry or green lot. In these situations, the rations are delivered to the cows and the quantities can be weighed or measured. However, many farmers graze their cows on crops or pastures or use self-feeding techniques except for supplements that may be fed in relatively small amounts around milking time. These production methods make it difficult, if not nearly impossible, to estimate the quantity and quality of the intake that the cows are themselves selecting.

If the cows are in proper condition before calving and if they are efficiently milked, several situations may arise after calving.

Starting Yield	Body Weight	Changes in Feed Rations
Good, but declines soon after	Constant	Add protein supplement
Good, but declines soon after	Declines	Add energy as well as protein supplement

The well-conditioned cow that loses weight after calving should increase her milk yield, or at least not decrease it. In fact, if she is going to produce 12 to 15 litres or more a day for any length of time, she will have to lose some weight, cows usually cannot graze enough in a day to produce more than this amount for any length of time without losing weight, irrespective of how good the feed may be. The weight lost is largely body fat stored when she was dry for this purpose.

Thus, the areas of nutrition which can be manipulated in milk production to influence income over food cost are:

- (i) the cost of feed ingredients used in the ration;
- (ii) the quality of the ingredients used in the ration; and,
- (iii) feeding the proper ration at the proper time.

NUTRITION AND THEIR ROLE

Energy: Carbohydrate and fat are the primary energy sources in a dairy ration. If the dairy ration does not contain enough energy, then protein that might otherwise be used

for maintenance, growth or milk production, is used for energy. To avoid this uneconomic use of expensive nutrients, there should be a proper balance between protein and energy in the diet. A major portion of the energy needs of high-producing cows and buffaloes goes for milk production. Adequate supplies of energy are particularly important during the early part of lactation. Fats present in usual rations appear to be adequate for dairy animals.

Energy requirement for maintenance of animals depend on their activity. Lactating cows require 10-15 per cent greater amount of energy for maintenance, compared to dry, non-pregnant ones. High-producing cows are unable to consume enough feed of low quality in early lactation, when they need the most to prevent some loss of body weight, calcium, phosphorus and perhaps protein. The losses

are minimised by feeding a properly balanced ration which a cow can consume to the desired quantity during the first 6-8 weeks after calving. The total energy requirements for a pregnant cow increases markedly during the last 4-8 weeks of pregnancy. An additional amount of energy during this period should be provided to meet the total requirements of the foetus and maternal development of the cow.

Protein: In order that a dairy cattle or buffalo grows, reproduces, maintains the body tissue, produces milk and stays healthy, protein must be present in dairy rations. After meeting the body needs, protein when given in excess is used as a source of energy. Therefore, only the requisite amount of protein required for the animal should be fed because protein is more expensive than the energy source. Cows and buffaloes, unlike poultry and swine, utilize poor quality protein or non-protein nitrogen compounds, because bacteria and protozoa in the rumen can form essential amino acids that are required by the animals.

For most efficient digestion and fermentation in the rumen, diets for cattle and

buffalo must contain 11-12 per crude protein or more. Utilization of protein may be limited by inadequate energy in the diet, and the available energy for rumen micro-organism is an important factor in protein nutrition.

Minerals: Minerals are required for growth, maintenance and milk production in dairy animals. Some of them are needed for bones and teeth and others for use as constituents of the proteins and lipids. These are usually supplied in sufficient amount in the regular ration. Their deficiency may affect growth, production and reproduction of dairy animals. However, excessive levels of these elements in diets may be detrimental or toxic. The ratio of calcium to phosphorus in bone is about 2:1 in or older animals and somewhat lower in young animals. In milk, the ratio is about 1.3:1. Therefore, the ratio of calcium to phosphorus is important in view of their utilization and other animal performance such as growth and milk production.

Vitamins: Cattle and buffaloes meet most of the vitamin requirements from natural feeds, rumen synthesis and tissue synthesis. Vitamin D and E are usually present in significant amounts in high quality forages. B vitamins and vitamin K are synthesized in the rumen, and vitamin C is synthesized in the tissues. Supplementary vitamins are not required by cattle and buffaloes when they receive green forage or good quality hay. In other situation when these supplies are limited or milk replacers are used extensively for young calves, it is necessary to supply commercially prepared feed supplements. Intramuscular injection of fat-soluble vitamins can also be used.

Water: Water is the most vital element in cattle ration. Dairy animals suffer more quickly and severely from lack of water than from the deficiency of any other nutrient, particularly when they are in milk. A restricted intake of water lowers the feed intake and the retention of nitrogen. Water intake is largely affected by the nature of the diet, ambient temperature, humidity, breed, body size, milk yield and the amount of water and protein in the feed. For maximum growth and milk production, dairy animals should have access to clean and fresh water at all times. Supply of water is equally important in winter as in summer.

DAIRY FEEDS

A properly balanced dairy-cattle ration should consist of both roughages and concentrates. It is particularly true in high milk-yielding cows and buffaloes. For economic milk production, fodder should make up the largest part of the ration since it is the cheapest source of nutrients. The nutritive value of some commonly available concentrates and fodder are given in tables 53 and 54.

Excellent pasture is generally considered as better fodders for dairy animals. Unfortunately, the availability of pastures is declining and becoming extinct in several parts of our country. Our cattle mainly depend on straws and kadbis (crop residues) and seasonal farm grown forage crops. Roughage feeding, therefore, includes straw, "kadbis", green fodder, hay, silage and pasturage.

Straw: Farmers use straws and "kadbis" to a great extent for feeding their dairy animals. The intake and digestibility of these fodders are reported to increase when fed along with green forage or after being chemically or biologically treated. Several methods like chaffing, mixing with green forage, treating with chemicals, ensiling, adding molasses and urea have been applied to increase the feeding value of this class or poor quality fodders.

Hay: Good hay should be leafy, green in colour, free from mould and foreign materials. It should preferably be made from legume crops. It must be cut at an early stage of maturity. Hay from a late crop cut is considerably less palatable and lower in total digestible nutrient, protein, calcium, phosphorus and carotene.

Cereal hays can be made from oats, barley, "bajra", etc. These hays when cut early in the flowering stage and sufficiently before the milk stage retain much of their green colour and have reasonably good feeding value. However, they are less palatable and nutritious than legume hays. Cereal hays are low in protein and so they must be fed with a protein supplement. Legume hay contains higher protein and calcium than cereal hay. They are also more palatable. The most important point to remember in preparing legume hay is to preserve leaves which contain over 75 per cent protein of the whole plant. Good quality hay is made mostly from lucerne and berseem crop, if they are cut at the proper

High-producing crossbred cows and buffaloes have been found to require comparatively more nutrients for their body metabolism than the low-producing animals. The efficiency of nutrient utilization also declines with the higher intake. On an all-forage diet composed of succulent legume fodder, high-producing cows are unable to consume the required quantity of nutrient. Thus, it becomes essential to feed high-energy concentrates in a judicious manner. Various formulae of concentrate mixtures, which provide approximately 14 per cent DCP and 70 per cent TDN, have been included in Table 47. Any of these concentrate mixtures, which are based mainly on agro-industrial wastes/byproducts and have successfully been used, can be prepared by the farmers according to the availability of ingredients.

[illegible]

TABLE 48. Feeding schedule for an average mature lactating cow or buffalo of low to high milk production potentiality.

Feedstuffs	Cow (400 kg)				Buffalo (450 kg)			
	I	II	III	IV	I	II	III	IV
		(Quantity in kg/day)				(Quantity in kg/day)		
<u>A. MILK YIELD UPTO 5 kg</u>								
Lucerne/Berseem green	26	-	-	-	30	-	-	-
Maize/Jowar green	-	50	-	-	-	60	-	-
Oats green	-	-	35	-	-	-	40	-
Jowar kadbi/wheat straw	4	-	3	8	4.5	-	3	7.5
Concentrate mixture	-	-	-	3.5	-	-	-	4
<u>B. MILK YIELD FROM 5-8 kg</u>								
Lucerne/Berseem green	48	-	-	-	55	-	-	-
Maize/Jowar green	-	56	-	-	-	56	-	-
Oats green	-	-	40	-	-	-	45	-
Jowar kadbi/wheat straw	1	-	2	8	-	-	2	8
Concentrate mixture	-	1	-	4.5	-	2	-	5
<u>C. MILK YIELD FROM 8-10 kg</u>								
Berseem/Lucerne green	60	-	-	-	60	-	-	-
Oats green	-	50	-	-	-	50	-	-
Maize/Jowar green	-	-	35	-	-	-	40	-
Concentrate mixture	2	3	4	-	3	4	5	-
<u>D. MILK YIELD UPTO 15 kg</u>								
Berseem/Lucerne green	60	-	-	-	60	-	-	-
Oats green	-	50	-	-	-	50	-	-
Maize/Jowar green	-	-	35	-	-	-	30	-
Concentrate mixture	4	4.5	6	-	5	6	7	-

TABLE 49. Nutrient requirement of growing cattle (Growth rate 550 g/day).

Live-weight (kg)	DM (kg)	DCP (g)	TDN (kg)	Ca (g)	P (g)
70	2.10	259	1.39	8	5
80	2.33	282	1.53	9	6
100	2.78	328	1.80	12	9
120	3.23	373	2.07	15	11
140	3.67	419	2.34	17	12
150	3.90	442	2.47	20	13
160	4.12	465	2.61	20	13
180	4.57	510	2.88	20	13
200	5.02	556	3.14	20	13
220	5.47	601	3.41	22	15
240	5.97	647	3.68	25	17

TABLE 50. Nutrient requirement of growing buffaloes (Growth rate 450 g/day).

Live weight (kg)	DM (kg)	TDN (kg)
70	1.97	1.24
80	2.20	1.38
100	2.65	1.64
120	3.10	1.91
140	3.56	2.18
160	4.01	2.45
180	4.46	2.72
200	4.21	2.98
220	5.36	3.25

TABLE 51. Nutrient requirement for maintenance of cattle and buffaloes.

Live-weight (kg)	DM (kg)	DCP (g)	TDN (kg)	Ca (g)	P (g)
250	4-5	140	2.20	25	17
300	5-6	168	2.65	25	17
350	6-7	195	3.10	25	17
400	7-8	223	3.55	28	20
450	8-9	250	4.00	31	23
500	9-10	278	4.45	31	23
550	10-11	310	4.90	31	23
600	11-12	336	5.35	31	23

TABLE 52. Requirement of nutrients per kg milk production.

Fat (%)	DCP (g)	TDN (g)
3.0	48	275
3.5	51	300
4.0	55	325
4.5	58	350
5.0	62	375
5.5	65	400
6.0	68	425
6.7	72	450
7.0	75	475
7.5	79	500

Note: 2.8 g calcium and 2.0 g phosphorus should be provided per kg of milk produced.

Source: Nutrient Requirements of Livestock & Poultry, Recommendations of the Scientific Panel on Animal Nutrition & Physiology, ICAR, New Delhi, 1982.

TABLE 53. Composition of feeds for dairy cattle and buffalo — concentrates.

Feeds	Local name	Dry matter %	Protein		TDN %	Energy per kg		Ca %	P %
			Total %	Digestible %		Digestible Kcal	Metabolizable Kcal		
Grain									
Barley	Joe	90	8.7	6.9	79	3483		.06	.33
Bajra	Bajra	89	11.9	5.1	61	2665	2185	.12	.46
Jowar	Jowar	87	15.2	7.3	86	3772	3093	.12	.44
Maize	Makki	89	8.9	6.8	81	3571	2928	.02	.31
Oats	Jai	89	11.8	8.8	68	2998	2458	.10	.35
Wheat	Gehun	89	13.0	10.1	78	3449	2820	.50	.40
Seed									
Cotton	Benola	93	24.9	15.7	91	4012	3290	.15	.73
Gram	Chana	88	19.9	14.3	82	3608	2959	.30	.36
Guar	Guara	86	34.6	32.2	79	3468	2844	.27	.42
Mustard	Sarson	91	13.5	8.8	61	2690	2206	.04	1.42
Soybean	Soybean	91	36.8	33.1	81	3571	2928	.25	.59
Cakes and meals									
Cotton seed cake	Benola ki khal	93	41.4	33.5	73	3219	2640	.18	1.15
Cotton seed meal	Benola ka chura	91	41.6	33.7	64	2822	2314	.15	1.10
Groundnut-cake	Mungfali ki khal	92	45.8	41.7	80	3527	2892	.17	.57
Guar meal	Guar ka chura	91	43.6	36.8	67	2959	2426	.70	.56
Mustard cake	Sarson ki khal	94	33.1	28.5	75	3307	2712	.84	1.10
Sesame cake	Til ki khal	93	51.5	41.2	75	3307	2712	2.18	1.39
Soybean meal	Soybean ka chura	90	43.8	37.2	77	3395	2784	.27	.63
Sal seed meal		90	9.2	—	41	1808	1483	.12	.19
Others									
Gram husk	Chana ka chhilka	—	4.0		55	2429	1992	1.18	.05
Wheat bran	Gehun ka chokar	89	16.0	12.5	62	2734	2242	.14	1.17
Rice bran	Chawal ka chokar	91	13.5	8.8	61	2690	2206	.06	1.82
Molasses	sheera	74	3.0	1.7	67	2954	2422	.66	.08

Source: Feeds and Feeding of Dairy Animals by Dr K Pradhan, put in Indian Yearbook of Veterinary and Animal Sciences, HAU, pp 218-19.

TABLE 54. Composition of feeds for dairy cattle and buffalo—roughages.

Feeds	Local name	Dry matter %	Protein		TDN %	Energy per kg		Ca %	P %
			Total %	Diges- tible %		Diges- tible Kcal	Metaboli- sable Kcal		
Green forage									
Bajra flowering	Bajra	24.2	8.5	4.3	59	2596	2129	0.5	0.31
Berseem flowering	Berseem	15.4	21.0	14.1	60	2640	2165	2.18	0.52
Cowpea flowering	Lobia	14.5	18.9	9.4	58	2557	2097	1.34	0.30
Guar flowering	Guar	17.5	17.5	6.13	49	2156	1768	2.49	0.39
Jowar (Sorghum)	Jowar								
Preflowering		16.3	18.7	7.1	53	2337	1916	0.53	0.24
Flowering		21.5	9.7	3.7	56	2469	2024	0.48	0.20
Post-flowering		39.3	4.5	0.7	54	2381	1952	0.32	0.21
Lucerne	Rijka								
Preflowering		20.5	24.5	16.0	61	2734	2242	2.30	.40
Flowering		24.9	20.3	13.9	60	2646	2170	2.30	.31
Post-flowering		29.9	16.0	13.2	50	2646	2170	1.59	.27
Maize flowering	Makki	24.1	9.4	5.7	66	2866	2350	.70	.32
Metha flowering	Metha	15.5	16.1	—	—	—	—	2.06	.51
Mustard	Sarson								
Preflowering		16.7	31.2	25.0	71	3130	2567	.58	.56
Flowering		42.5	10.6	8.5	72	3175	2604	.28	.30
Post-flowering		45.0	6.3	3.2	68	2998	2458	—	—
Napier	Hathi								
Preflowering		14.9	11.0	6.9	63	2778	2278	.60	.41
Flowering		23.0	9.2	5.8	62	2734	2278	.62	.56
Post-flowering		33.5	7.6	4.8	62	2734	2272	.62	.54
Oats	Jai								
Preflowering		12.5	12.2	11.3	64	2910	2386	.60	.41
Flowering		18.0	8.6	9.2	66	2910	2386	.62	.56
Post-flowering		30.0	6.0	6.0	65	2866	2350	.62	.54
Senji flowering	Senhi	21.0	19.6	7.91	60	2607	2138	—	—
Hay									
Berseem	Bersim	88.5	14.70	10.3	50.1	2222	1822	1.48	.28
Cenchrus special	Anjan	—	—	1.71	46.5	2046	1678	.28	.21
Cowpea	Lobia	90.5	18.4	12.9	63.0	2778	2278	1.34	.78
Jowar (sorghum)	Jowar	84.7	7.7	2.9	56.0	2557	2097	0.31	.21
Lucerne	Rijka	88.0	14.0	10.1	50.0	2112	32	1.13	.18
Oat	Jai	90.0	6.4	3.1	56.0	2469	2025	0.23	.21
Kadti/straw									
Bajra	Bajra	88.0	2.62	0.93	53.4	2352	1885	0.3	.1
Barley	Jce	88.0	3.6	0.6	43.0	1896	1555	0.3	.08
Gram	Chana	86.0	3.9	2.4	37.1	1632	1338	1.4	.16
Jowar	Jowar	91.0	7.0	3.1	51.0	2294	1844	0.74	.28
Maize	Makki	87.2	5.1	2.2	59.0	2601	2133	0.29	.11
Paddy	Dhan	91.5	4.2	1.0	48.0	2116	1735	0.24	.09
Wheat	Gehun	90.0	3.2	0.4	43.0	1896	1555	0.15	.07

Source: Feeds and Feeding of Dairy Animals by Dr K Pradhan, pub in Indian Yearbook of Veterinary and Animal Sciences, HAU, pp 216-17.

TABLE 55. Chemical composition and nutritive value of Indian feedingsuffs.

S No	Name	Chemical composition on DM basis					DCP	TDN	Nutritive value on kg/100 kg dry matter basis**		
		CP	CF	NFE	EE	TA			Mcal/kg dry matter		
									DE	ME	
ROUGHAGES											
1.	Pearl-millet (<i>Pennisetum typhoides</i>) Milk stage	10.6	28.0	50.2	2.1	9.2	-	-	-	-	-
	All analysis	6.9	31.8	48.9	1.5	10.9	4.3	59.2	2.6	2.1	2.1
2.	Berseem (<i>Trifolium alexandrinum</i>) Average (all analysis)	17.4	25.9	40.7	1.9	14.2	12.5	59.2	2.6	2.1	2.1
3.	Cowpea (<i>Vigna unguiculata</i>) Average	18.2	25.3	39.6	2.6	14.2	-	-	-	-	-
GRASSES											
4.	Bermuda grass (<i>Cynodon dactylon</i>) Average	10.5	28.2	47.8	1.8	11.8	-	-	-	-	-
5.	Bore Love (<i>Eragrostis chloromelas</i>) Average	6.8	37.0	48.4	1.4	6.4	-	-	-	-	-
6.	Canary young grass Flowering	13.9	9.9	31.3	5.2	19.7	-	-	-	-	-
7.	Napier hybrid	10.2	30.5	41.0	2.1	16.2	-	-	-	-	-
8.	Para grass (<i>Brachiaria mutica</i>) In running water	12.0	28.2	45.7	2.9	11.2	67.9	59.5	-	-	-
	Waterlogged	6.9	35.4	46.1	0.8	10.8	-	-	-	-	-
9.	Rye (<i>Lolium perenne</i>)	15.4	32.3	38.0	1.2	13.1	-	-	-	-	-
10.	Spear grass (<i>Heteropogon contortus</i>) (average)	12.2	13.3	63.2	3.6	7.8	-	-	-	-	-
	Sudan grass (<i>Sorghum sudanense</i>)	5.2	33.8	50.1	1.8	9.1	-	-	-	-	-
11.	Guar (<i>Cyamopsis tetragonoloba</i>) 2-month old	5.7	27.0	51.0	1.9	14.4	1.6	44.4	2.0	1.6	1.6
12.	Sorghum (<i>Sorghum bicolor</i>) Young	8.6	30.0	47.6	1.7	12.7	6.1	48.8	2.2	1.8	1.8
13.	Lucerne (<i>Medicago sativa</i>) Average	18.1	31.9	37.6	1.9	10.4	-	-	-	-	-
	Maize (<i>Zea mays</i>) Average	8.9	35.1	44.4	2.1	9.4	4.2	56.3	2.5	2.0	2.0
14.	Maize (<i>Zea mays</i>) Average	4.6	38.7	47.5	1.2	8.1	1.1	53.9	2.4	2.0	2.0
15.	Maize (<i>Zea mays</i>) Average	20.2	30.1	36.6	2.3	10.7	13.5	58.8	2.6	2.1	2.1
	Maize (<i>Zea mays</i>) Average	7.2	30.8	51.6	1.8	8.6	4.2	67.8	3.0	2.5	2.5

16.	Oat (<i>Avena sativa</i>) Milk stage	6.4	28.7	53.2	2.3	9.3	-	-	-	-	-	-	-
	Ripe	9.2	34.8	44.8	1.8	9.4	-	-	-	-	-	-	-
17.	Pea (<i>Pisum sativum</i>) Podding	11.8	29.8	48.7	1.0	8.7	7.8*	72.9*	3.2	2.6	-	-	-
18.	<i>Stylosanthes bojeri</i>	10.1	38.4	41.7	1.2	8.6	-	-	-	-	-	-	-
<u>TREE LEAVES AND SHRUBS</u>													
19.	Sugarcane tops (leaves)	5.5	36.3	48.5	1.5	8.2	2.7	45.7	2.0	1.6	-	-	-
<u>SILAGES</u>													
20.	Teosinte	5.6	31.5	48.3	4.6	10.2	-	-	-	-	-	-	-
<u>HAYS</u>													
21.	Alfalfa hay	14.1	31.7	41.6	1.8	10.8	-	12.0*	2.5	2.0	-	-	-
22.	Marvel grass hay In flower	4.1	39.9	44.4	1.0	10.6	-	-	-	-	-	-	-
23.	Oat (<i>Avena sativa</i>)	5.6	35.9	48.4	1.7	8.3	2.6	60.1	2.8	2.3	-	-	-
24.	Para grass hay	5.3	34.6	45.7	2.0	12.4	2.1*	46.2*	2.0	1.7	-	-	-
25.	Rhodes grass hay (<i>Chloris gayana</i>) Ripe	12.3	27.3	45.8	2.4	12.1	7.4	55.1	2.4	2.0	-	-	-
		6.4	39.3	44.1	1.3	9.1	3.1	53.0	2.3	1.9	-	-	-
26.	Spear grass (<i>Heteropogon contortus</i>) Ripe	5.3	36.9	46.9	1.2	9.7	0.0	50.7	2.2	1.8	-	-	-
27.	Sugarcane (<i>Saccharum officinarum</i>) leaves	2.6	37.2	52.7	1.4	6.1	0.0	46.3	2.0	1.7	-	-	-
<u>LEGUME HAYS</u>													
28.	Berseem (<i>Trifolium alexandrinum</i>)	14.7	30.6	41.0	1.6	12.1	10.3	65.8	2.9	2.4	-	-	-
29.	Cowpea (<i>Vigna unguiculata</i>) hay Large variety without pods	15.3	34.8	35.4	1.1	13.3	10.3	50.5	2.2	1.8	-	-	-
		11.4	32.8	45.9	1.4	8.6	7.5	55.6	2.4	2.0	-	-	-
30.	Gram hay, average	12.2	33.0	41.8	2.3	10.2	-	-	-	-	-	-	-
31.	Groundnut hay	21.5	24.5	38.2	1.0	14.8	14.9	48.9	2.2	1.8	-	-	-
32.	Lucerne hay	21.3	29.4	35.2	1.4	12.7	16.4	55.9	2.5	2.0	-	-	-
33.	Pea (<i>Pisum sativum</i>)	10.9	29.2	50.3	1.9	7.7	-	-	-	-	-	-	-
<u>STRAWS</u>													
34.	Barley straw	2.2	47.4	41.4	0.9	8.1	0.8*	46.9*	2.0	1.7	-	-	-
35.	Sorghum (<i>Sorghum bicolor</i>) straw, average	3.8	35.6	51.0	1.3	8.3	1.2	56.4	2.5	2.0	-	-	-
36.	Maize kadbī (straw)	3.6	33.2	51.9	0.8	10.5	-	-	-	-	-	-	-
37.	Wheat bhoosa, average	3.6	34.0	1.5	13.7	-	-	-	-	-	-	-	-
38.	Wheat straw, average	3.2	34.9	43.8	1.5	11.6	0.0	48.4	2.1	1.7	-	-	-

TABLE 55. (Contd) Chemical composition, and nutritive value of Indian feedingsuffs.

S No	Name	Chemical composition on DM basis					DCP	TDN	Nutritive value on	
		CF	NFE	EE	TA	kg/100 kg dry matter basis**			dry matter	ME
						Mcal/kg			DE	
CONCENTRATES, GRAINS AND SEEDS										
39.	Cotton seed, average	18.1	21.6	18.2	4.6		12.5	88.8	3.9	3.2
40.	Gram	17.4	11.4	4.3	5.3		-	-	-	-
	Chuni, average	15.2	-	2.5	2.8		7.3	85.7	3.8	3.1
41.	Sorghum (Sorghum bicolor)	11.1	1.9	4.4	1.9		8.2	94.3	3.5	2.9
42.	Maize	9.3	15.5	5.8	5.1		-	-	3.5	2.8
43.	Oat, average	41.6	6.0	17.4	6.1		37.5	87.5	3.9	3.2
44.	Soyabean seeds	10.4	2.0	2.6	2.4		6.3	92.3	4.1	3.3
45.	Wheat									
	Average									
CAKES AND MEALS										
46.	Coconut-cake	23.5	10.2	9.6	6.8		22.8	83.86	3.7	3.0
	Expeller pressed, average	27.5	18.4	9.4	6.4		19.4	79.6	3.5	2.9
47.	Cotton-seed-cake, average	47.0	6.1	6.6	7.5		46.4	78.9	3.5	2.9
48.	Groundnut-cake, average	21.4	8.7	18.7	2.9		15.3	82.3	-	-
49.	Maize-cake, average	35.0	7.9	10.0	9.0		39.0	86.8	3.8	3.1
50.	Rape-cake (Brassica campestris), average	42.7	5.1	6.5	12.6		42.6	86.9	3.8	3.1
51.	Sesame-cake (Sesamum indicum)	26.2	22.9	20.5	6.8		22.7	71.0	3.1	2.6
	Average									
52.	Sunflower-seed-cake									
BY-PRODUCTS										
53.	Arhar (Cajanus cajan) husk, average	6.3	41.5	2.0	5.0		-	-	-	-
54.	Bagasse	3.1	45.1	4.2	3.0		0*	22.3*	1.0	0.8
55.	Brewery grain	19.2	13.5	3.8	4.2		-	-	-	-
56.	Cowpea husk	7.4	24.6	4.7	12.2		-	-	-	-
57.	Groundnut husk	17.8	12.1	16.7	7.1		-	-	-	-
58.	Guar powder	42.9	12.3	3.7	5.9		-	-	-	-
59.	Maize									
	Bran	11.9	10.5	1.7	0.8		6.2*	76.7*	3.4	2.8
	Gluten	24.9	1.8	1.8	6.4		21.4	68.5	3.0	2.5
60.	Mango-seed kernel	6.5	4.0	11.0	2.2		4.7	70.0	3.1	2.5

		0.9	-	93.1	10.2	2.3	-	-	-
61.	Molasses (Khandsari)								
62.	Rice								
	Bran, average								
63.	Rice bran polish, average	10.4	22.6	38.1	7.5	21.5	7.9	70.3	3.4
		6.1	27.4	42.0	4.5	19.9	-	-	2.8
64.	Tapioca (Manihot esculenta)	1.9	2.3	94.4	0.2	1.2	1.5	83.3	3.0
	Flour	2.9	10.9	76.2	0.4	9.5	-	-	-
65.	Wheat bran								
	Average	12.8	11.1	64.3	3.2	8.4	10.3	72.7	3.3
									2.7

*As no digestibility figures have been reported by Indian workers, foreign digestibility coefficients have been used to calculate the nutritive values of these feeds. There figures are therefore approximate.
Where not available, the values of DE and ME are calculated from the TDN values as follows:

$$1 \text{ kg TDN} = 4.4 \text{ Mcal of DE}$$

$$1 \text{ kg TDN} = 3.6 \text{ Mcal of ME}$$

**For converting the values expressed on dry matter to those on raw-matter basis, the following ad hoc figures for dry-matter content of different category of feeding stuffs may be employed:

(a)	All air-dry materials, such as dry roughages, cake, grain, etc.	90 per cent
(b)	Succulent silage	30 per cent
(c)	Green pasture, green forages	25 per cent
(d)	Jowar (prime)	30 per cent
	Sorghum (ripe)	40 per cent
(e)	Green legume	20 per cent

Source: Nutritive Values of Indian Cattle Feeds and the Feeding of Animals by K C Sen, Revised by S N Ray and S K Ranjhan, 1978, ICAR, New Delhi; pages 27-55.

Ten Pointers for Effective Feed Management

To fully tap the potentials of high-yielding cows and buffaloes, the following points of feeding management are of practical importance:

- Feeding dairy animals on home-grown fodder especially leguminous or a mixture of leguminous and non-leguminous would be most economical as compared to feeding them on crop residues and concentrates.
- Feed roughages (hay or hay and silage) twice a day and concentrates or grain mixture at or before milking. Green forages are much more palatable than the hays prepared from them. Through liberal feeding of greens or silage, the need to feed concentrates can be cut down by 33 per cent. When leguminous fodder such as lucerne and berseem is fed, the quantity of concentrates can be further cut down. Again, the greens especially leguminous fodder should not form the entire roughage ration because of the risk of producing bloat. It should be mixed with green grasses/hay or other non-leguminous fodders/crop residues before feeding. If grass is not readily available, it may be replaced with straw in the proportion of 1 kg of straw for every 4 kg of green grass. Long grasses/other fodder/crop residues must be chaffed before feeding to reduce wastage.
- Concentrate must be fed after moistening it with some water to reduce dustiness. The moistened feed should be fed the same day.
- The digestive system of a high-producing dairy animal has a limited capacity and so to obtain the required nutrients, the digestibility of the ration on dry matter basis must be 65 per cent or higher. It will enable the cow to assimilate the available nutrients in the feed. Roughages may have to be supplemented with feed concentrates to ensure nutrients for maximum milk production.
- The cow must be "conditioned" adequately before calving so as to have the needed body reserve for good milk production after calving. For this, it must calve in relatively fat condition and so must be on a fattening ration for the last two months of the dry period. It must be provided energy requirements equal to that of a cow producing about 10 kg of milk a day and gain at least half a kg in bodyweight every day in the last two months of lactation. Feed at least 1 kg of concentrate mixture per day and in larger quantities for the high-yielder.
- A dry cow is often considered as a cow which is not in 'profit', whereas it should be considered as a cow 'preparing for profit' — and the amount of the profit depends on the thoroughness of the preparation. In a herd that is well managed, the dry cow rates high in priority for feed.
- A well-conditioned cow loses weight after calving, but increases her daily milk yield. In fact, if it is going to produce 10 to 12 kg or more milk a day for any length of time, it will have to lose some weight. Cows usually cannot take enough feed in a day to produce this quantity of milk for any length of time without losing weight, irrespective of how good the feed may be. The weight loss is largely from body fat stored for this purpose when it was dry. A well-grown Jersey cow may lose about 50 kg in the two months after calving, while a large Holstein may lose 150 kg over the same period.
- The cow that is poorly conditioned at calving time is hardly likely to respond to additional feed inputs. In any case, her yield will be mediocre or even low. Some of the additional feed supplied will be diverted to her body conditioning. It is more expensive to fatten cows after calving than it is to fatten them before calving.
- For maximising income, the dairy animals should be fed individually according to their individual milk yield and nutritional requirements, instead of allowing the same ration to each animal in the herd. Liberal feeding is necessary for continued high milk production and its persistency throughout the lactation.
- Abundant supply of clean drinking water all the time is essential. It is the most essential feed ingredient. Do not permit cattle to drink water from dirty ponds, streams or tanks as it would result in increased incidence of diseases, lowered vitality and decreased milk production. The daily water intake for an animal of 300 kg bodyweight yielding 5 kg of milk per day will be about 35-40 litres. About the same quantity of water is required for the general cleanliness of the animal and its shed.

The key to profitable dairy farming is the prompt detection and accurate diagnosis of diseases and their immediate treatment. Negligence in the management of dairy animals predisposes them to certain diseases which can cause heavy economic losses.

Health Care

Dr P.G. SUPEKAR
*Associate Professor (Veterinary Medicine),
Veterinary College, Mhow*

WITH the increasing productivity of dairy animals, the dairy farmer is now aware of the need to adopt adequate health care and management practices to protect the animals and his profits. Diseases can cause mortality, but more often results in morbidity which causes loss through reduced milk production, consequently resulting in set back to economic dairy farming. Conversely, effective disease prevention and control measures can enhance milk production. A 20 per cent increase in milk yield — say, from 10 to 12 kg — thus achieved can more than offset the cost of health care. It is generally not appreciated that the cost of veterinary care is only about Rs 50-100 per animal per year. There is, thus, enough motivation for the progressive dairy farmer to provide effective health cover on his farm.

He needs to follow sound health management practices including a vaccination programme to monitor the health status of his herd and spot the occurrence of diseases at the early sub-clinical phase. For example, mastitis or parasitic diseases may not always manifest visible symptoms, but economic losses caused by them are significant, though difficult to quantify. Not all losses due to diseases can be avoided, but these can be kept low by the application of scientific disease control — hygiene and prophylactic measures. Despite all possible precautions, diseases do occur.

A farmer must be alert to notice the first symptoms of a disease, arrange for its timely treatment before it flares up.

Some of the symptoms that indicate the onset of a disease are: dullness, depression, rough hair coat, dry muzzle, respiratory distress such as sneezing and coughing (more pronounced at night), drop in milk production and feed intake. Proper daily milk recording is essential to judge the drop in milk production, leading to early spotting of diseases. The key to profitable dairy farming is the prompt detection and accurate diagnosis of diseases and their immediate treatment.

Diseases usually originate in three ways: through contaminated premises; with the arrival of new animals; and by natural and mechanical carriers. In animal care, the motto "prevention is better than cure" is particularly apt. Vaccination is one of the surest ways of preventing diseases by building up immunity against them. In some diseases, particularly viral diseases such as rinderpest and foot-and-mouth disease, against which no effective curative treatment is available, prophylactic vaccination offers the only way to protect the animal.

It is advisable to know the period of immunity created by vaccination, the age at which the animal must be vaccinated, the dose and route of vaccination, and the storage conditions for stocking the vaccines. Such precautions as vaccinating the animal in the cool hours (late evening or early morning) must be rigidly followed.

By finding out the prevalence of infectious diseases in the area, a schedule of vaccination can be prepared. The local vet-



**Balanced feed means good health.
Good health means better production of milk.
Better production of milk brings higher profits.**

Cattle require vitamins to keep healthy and strong. Addition of vitamins to the feed at the recommended levels ensures improved growth of calves, lower mortality, better resistance to infections, higher fertility and greater ability to overcome stress.

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The Ideal Feed Supplement Containing Vitamins A and D



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erinarian should be consulted to provide the necessary guidance. Besides vaccination, other methods of disease prevention are: purchase of quality stock from a reputable breeder of breeding farm; providing hygienic environment in the cattle shed through suitable sanitation and proper management measures.

Preventive Steps: There are three effective steps which should normally be followed. They are:

- **Routine Vaccination:** Vaccination against rinderpest, foot-and-mouth disease and haemorrhagic septicaemia should usually be done. Vaccination for anthrax and black-quarter should be done only in endemic areas.
- **Detection and Vaccination:** Tuberculosis (TB), Johne's disease and Brucellosis are, generally, diseases affecting the herd. These diseases may run clinical or sub-clinical course. To develop a clean herd, it is necessary to detect the diseases with the help of diagnostic tests. Cull the infected animals and thus raise a healthy herd. In case of brucellosis, if incidence is more than 5 per cent in the herd, vaccination of female calves may be practised.
- **Elimination of intermediate hosts:** This method is generally adopted in protozoan and helminthic infections in which intermediate hosts transmit the disease. In liver fluke infection, snails play a role of intermediary host. In theileriosis and ticks, blood-sucking flies (*Tabanus* and *Stomoxys*) are the vectors, disease-transmitting organisms. Insects, ticks and mites also act as intermediate hosts of a number of other diseases. Proper and timely measures should be taken to destroy the intermediate hosts and different vectors.

Disease Control: Before a disease manifests itself, the animal exhibits certain changes in its behaviour. If these changes are observed in time, it helps the dairy farmer to take effective preventive measures. It would be desirable for the farmer to observe his animals at least twice a day, preferably at the time of feeding and/or milking, and twice a week at night when the animals are resting. During these visits, the animal should be observed for its behaviour in comparison with other animals in the herd. When it is on the

move in the open, the variations from the normal signs of health, such as glossy coat, wet muzzle, alert ears and bright eyes can be observed. For details, see the "Guidelines for Early Detection of Impending Diseases".

Negligence in the management of dairy animals predisposes them to certain diseases, which may not develop in an acute form but can cause heavy economic losses. For example, a major cause of reproductive disorders and worm infestations is inadequate or improper feeding. The animals, being semi-starved, are attracted for grazing and drinking water to infested marshy lands and village tanks. In a recent survey conducted in Kheda district of Gujarat, it was found that these diseases accounted for nearly one-third of the total losses due to all animal diseases.

The control of disease at the time of an outbreak broadly requires a different approach:

- The first step is to examine the ailing animal and confirm the disease;
- Segregate the sick, the "in-contact" and healthy animals into three groups;
- Treat the affected animals;
- Keep those "in-contact" under close observation;
- Vaccinate the healthy animals;
- Burn the carcass or bury it under 15 cms lime in a pit about two metres deep;
- Disinfect the premises with 3 per cent lysol or phenol; and
- Keep separate attendants, if possible, or have them to attend the sick last.

In case of latent herd diseases like mastitis:

- Test the milk collected from individual teats by the indirect tests available;
- Segregate the infected animals and treat them;
- Maintain sanitation in the shed; and
- Adopt hygienic and scientific milking methods.

In the following pages are listed important diseases of cattle, indicating their major causes, key symptoms, diagnosis, treatment and prevention.

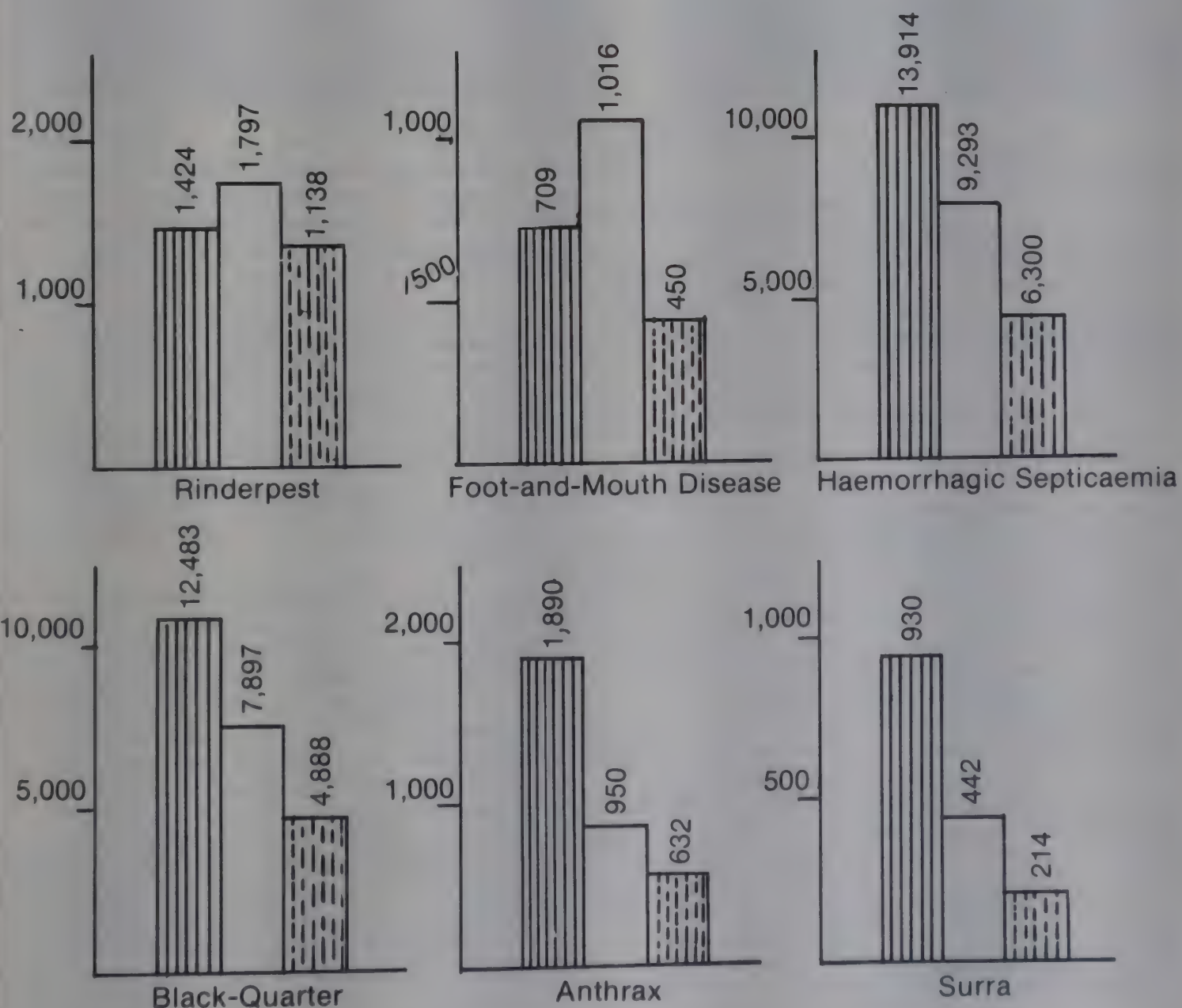
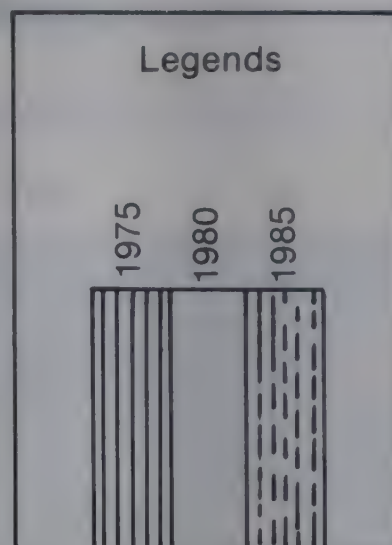
TABLE 56. A comparative account of incidence of contagious diseases among livestock in India.

Disease	Outbreaks		Attacks		Deaths	
	1975	1980	1975	1980	1975	1980
					1975	1980
						1985*
Rinderpest (Bovines)	130	269	2,799	4,124	1,424	1,112
Foot & Mouth Disease	2,643	2,640	2,76,209	1,92,116	709	559
Haemorrhagic Septicaemia	5,465	3,998	22,086	17,259	13,814	9,293
Black Quarter	6,182	4,562	17,119	12,681	12,483	7,897
Anthrax	485	231	3,131	1,706	1,890	950
Surra	257	132	1,909	1,051	930	442
Sheep & Goat Pox	251	191	2,741	3,865	693	1,275
Enterotaxaemia	654	347	3,214	1,302	2,436	1,055
Contagious Caprine Pleuropneumonia	43	14	2,982	442	878	65
Swine Fever	6	77	202	1,531	150	653
Ranikhet Disease	555	557	24,825	32,111	9,084	14,741

*Provisional

Source: Ministry of Agriculture, Government of India.

MORTALITY DUE TO MAJOR CATTLE DISEASES IN INDIA DURING 1975, 1980 & 1985



Operation Rinderpest Zero

Dr S.C. MATHUR

*Joint Commissioner (Livestock Health),
Deptt. of Agriculture & Cooperation
Ministry of Agriculture, Government of India*

INDIA will launch "Operation Rinderpest Zero" from January 1, 1988. The Rs 200 crore (US \$166 million) campaign will cover the ongoing programmes as well as form a part of the South Asia Rinderpest Eradication Campaign (SAREC), under the aegis of FAO. At a meeting of SAREC held in New Delhi in April 1987, the strategy for the campaign was finalized.

Rinderpest is a deadly cattle plague that annually ravages the cattle and buffaloes of India. High mortality occurs in susceptible animals depending on the virulence of the virus strain involved, the innate nature of the various breeds and presence of secondary infection with latent pathogens. Prior to 1955, 200,000 animals used to die every year from rinderpest in India. Besides being the major constraint on the productivity of livestock, this disease constitutes a constant threat to livestock owners, while damaging the national economy and affecting the well-being of the human population. Rinderpest, like foot-and-mouth disease, is a major obstacle to international trade in livestock and livestock products.

Fortunately, efficient methods of combating the disease have led to its eradication from Europe and many parts of Asia. Rinderpest was widespread in South-East Asia when World War II ended. National campaigns were launched in infected countries and by the end of the 'fifties, the disease had been eradicated from most countries in South-East Asia. Mass vaccination campaigns launched between 1955 and 1960 have succeeded in bringing the "classical" disease under control in many areas of the Indian sub-continent, but failure to continue the vaccination of large number of susceptible animals in some areas has led to the continued presence of the disease in the sub-region. To meet this situation, it has become imperative that well-coordinated time-bound campaign against rinderpest be launched for its eradication.

The FAO Regional Animal Production and Health Commission for Asia and the Pacific (APHCA) had accorded the highest priority to rinderpest eradication from South Asia and had mooted for FAO support to organize the Campaign. Accordingly, a FAO Expert Consultation in Requirements of Rinderpest Eradication Campaign in South Asia was held in India in December 1983, which identified the external and the internal inputs required for the Campaign. The recommendations made by the Consultation, which was attended by experts from all the countries concerned, were endorsed by the annual meeting of APHCA held in New Delhi in 1984. As a corollary to this and in the context of FAO's strategy for global eradication of the disease it has been proposed to put into effect a regional programme for eradicating rinderpest from South Asian Countries on a time-bound basis.

This proposed South Asia Rinderpest Eradication Campaign (SAREC) will be implemented by each of the concerned five countries (Bangladesh, Bhutan, India, Nepal and Pakistan). A Coordinating Unit will be established in New Delhi, under a Regional UNDP Project to coordinate the Campaign activities and to provide technical support needed for the eradication of rinderpest.

The Indian Government's interest in the eradication of rinderpest is paramount and had clearly been expressed in practical terms when it appointed a Task Force on Rinderpest in 1983. The terms of reference of the Task Force included an assessment of existing resources and the formulation of a detailed action programme for eradication of rinderpest within a specified period. Government of India has allocated for this purpose over Rs 100 million and has asked the States for matching contributions. The objective in the Seventh Five-Year Plan (1985-90) is total eradication of the disease. ■

Only **Ivermectin** kills internal and external parasites by simple injection.



In sheep

'Ivermectin' controls roundworms and lungworms plus nasal bots and mange mites.

In cattle

Just one injection of 'Ivermectin' controls worms, mange mites, grubs and sucking lice and aids in the control of biting lice and ticks.

Only 'Ivermectin' can give you these other important benefits:

- Controls sheep mange without the stress and setbacks that come with dipping or spraying
- Provides effective mange control in any wool length—you won't have to shear your flock before treatment
- Removes nasal bots—a major annoyance to sheep
- Works longer against economically—important cattle parasites than ordinary wormers—7 times longer against lungworms and 4-5 times longer against *Ostertagia* and *Cooperia*.
- Offers consistent control of inhibited *Ostertagia* (conventional worming products offer erratic control)
- Allows greater weight gains and faster growth—you'll actually see the difference in the appearance and condition of your cattle
- Treats animals at any stage of pregnancy



Ivermectin controls these parasites of cattle and sheep.

Cattle Endoparasites

Gastrointestinal roundworms (adults and immatures):
Ostertagia ostertagi (includes inhibited)
O. lyrata
Haemonchus placei
Trichostrongylus axei *T. colubriformis*
Cooperia oncophora, *C. punctata*,
C. pectinata
Oesophagostomum radiatum
Nematodirus helvetianus (adults only)
N. spathiger (adults only)
Strongyloides papillosus (adults only)
Bunostomum phlebotomum
Toxocara vitulorum (adults)
Lungworms (adults and immatures)
Dictyocaulus viviparus
Other roundworms
Parafilaria bovicola *Thelazia* sp. (adults only)

Ectoparasites

Cattle grubs (parasitic stages)
Hypoderma bovis, *H. lineatum*
Tropical cattle grub (parasitic stages)
Dermatobia hominis
Screw-worm fly (parasitic stages)
Dermatobia hominis
Screw-worm fly (parasitic stages)
Chrysomya bezziana
Lice
Linognathus vituli, *Haematopinus eurysternus*, *Solenopotes capillatus*
Mites
P. communis var. *bovis*, *Sarcoptes scabiei*

var *bovis*

Ticks:

Ornithodoros saviqnyi

'Ivermectin' injection aids in the control of:

Biting lice:

Damalinia bovis

Tropical cattle ticks:

Boophilus microplus, *B. decoloratus*

Mites:

Chorioptes bovis

Sheep Endoparasites

Gastrointestinal roundworms (adults and immatures):
Haemonchus contortus
Ostertagia circumcincta, *O. trifurcata*
Trichostrongylus axei (adults only)
T. colubriformis, *T. vitrinus* (adults only)
Nematodirus filicollis
Cooperia curticei
Oesophagostomum columbianum
O. venulosum (adults only)
Chabertia ovina
Trichuris ovis (adults only)
Lungworms (adults and immatures)
Dictyocaulus filaria
Protostrongylus rufescens (adults only)

Ectoparasites

Nasal bot (all larval stages)

Oestrus ovis

Mange mites

Psoroptes communis var *ovis**

Sarcoptes scabiei

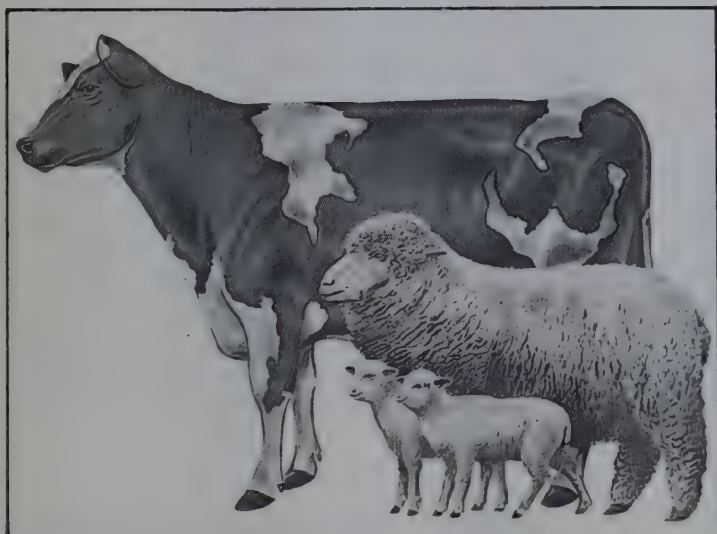
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MSD AGVET 

In cooperation with MSD AGVET
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Thiabendazole* 50% Premix W.D.P. the "production improver" for your cattle and sheep.



Worming with the "production improver" proves the difference.

For over twenty years worming with 'Thiabendazole 50% Premix' has consistently increased animal productivity. And we have the worldwide field trials to prove it.

More Meat

Pasture cattle wormed with 'Thiabendazole 50% Premix' gained an extra 6.4 kg per head in 100 days after treatment; and calves treated at weaning were 6.8 kg heavier.

More Milk

Dairy cows treated with 'Thiabendazole 50% Premix' increased their milk yield to over 181.4 kg of milk per lactation.

More Wool

Sheep wormed with 'Thiabendazole 50% Premix' showed an average of 0.8 kg extra wool and 41% more of better-styled wools than-unwormed sheep.

More Lambs

Ewes wormed with 'Thiabendazole 50% Premix' produced over twice as many heavier, better quality lambs than unwormed ewes.

Put Thiabendazole 50% Premix to work for you

Worming with 'Thiabendazole 50% Premix' means increased value at market because healthy animals are production animals. And productive animals make more money for you.

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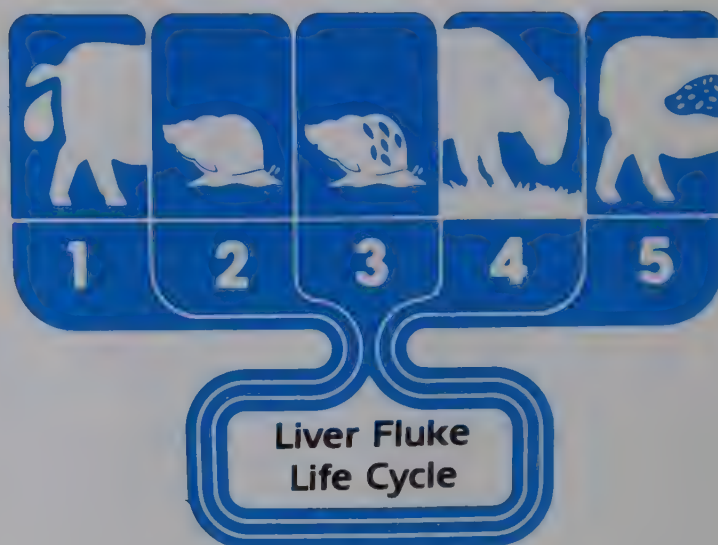
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Ranide* 20% Water Dispersible Powder

controls liver fluke and important worms in your cattle and sheep.



Liver fluke and roundworms deprive you of profits

Don't let these destructive internal parasites affect your animals and create financial losses for you:

- Decreased milk, meat and wool production
- General unthriftiness
- Weakened resistance to disease
- Poor feed conversion
- Slower growth
- Lower weight at slaughter
- Livers not edible

'Ranide' 20% W.D.P. gives you thorough, dependable fluke and worm control.

- Highly effective controls 99% of adult fluke controls up to 91% immature fluke
- World's Number 1 flukicide
- Wide Safety Margin
- Accurate dosage
- Easy to administer
- Non-staining
- Breaks the liver fluke cycle

1. Flukes inhabit the livers of cattle and sheep, where they lay thousands of eggs that are passed in the animals' dung.
2. Larvae hatch from eggs and seek small snails that live near bodies of water in your pasture. The larvae burrow into the snails, develop and multiply.
3. Now protected by a shell-like covering, the larvae leave the snails and infect your pasture. The fluke can survive for months in this form.
4. Grazing livestock swallow the fluke.
5. Young fluke bore out of the animal's stomach, migrating to the liver. In the bile duct an adult, egg-laying fluke can live for many years while feeding on liver tissue.

'Ranide' helps keep your animals and your profits healthy.

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Amprolsol^{*}

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Control coccidiosis fast
with the

water power

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Amprolsol^{*}

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and

For prevention of coccidiosis
incorporate in feed 500 g/ton
of feed

Amprolium and ethopabate
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DICTIONARY OF CATTLE DISEASES

ACETONAEMIA

Also known as ketosis. A metabolic disease; it occurs within a few days or a few weeks after calving. Caused by some factors that disturb carbohydrate metabolism and a rise in the formation of ketone bodies which are poisonous substances. The disease also results from intake of improper type of carbohydrates, especially during pregnancy. Symptoms: Sweetish chloroform-like odour is noticed in the expired air, urine and milk of the affected animal. Other signs are loss of appetite, rapid drop in milk production and rapid loss of body weight. Some cows show stiffness, nervousness, or abnormal behaviour. Diagnosis: The smell of acetone in the breath of a cow may be a useful pointer in the diagnosis of acetonaemia. Treatment: The animal be treated with intravenous injection of 50 per cent glucose in a 500 ml dose for 3 to 4 days. Propylene glycol or glycerol in a dose of 225 gms twice daily for two days is also effective. Prevention: Feed each cow a ration that is well-balanced in energy, protein, vitamins and minerals. The ration should contain sufficient amount of cobalt, phosphorus and iodine. At the calving, cow must be active, and in good condition with a good appetite.

AMPHISTOMIASIS

Commonly known as stomach/rumen fluke disease. A parasitic disease caused by Amphistomes. The immature parasites are responsible for damage to the gastric mucous membrane, leading to severe diarrhoea, wasting, oedema and anaemia resulting in death. Diagnosis: Through the microscopic examination of the faeces. Treatment: Give tetrachlorethylene or hexachlorethane in capsules or through stomach tube. It is advisable to put the entire herd under treatment as soon as the disease is detected in some of the animals. Prevention: Snails in the ponds and in the wet land around them should be destroyed. The control measures recommended for liver-flukes should be followed.

ANAPLASMOSIS.

Infection with Anaplasma marginale causes the disease which is chiefly characterised by fever and jaundice. Transmitted by ticks and blood sucking insects. Clinical disease is rare in indigenous animals. Exotic cattle are more susceptible. Symptoms: Sudden rise in temperature, loss of appetite, dullness, constipation, anaemia, jaundice, loss of condition and death in majority of cases. Diagnosis: In acute infection the organisms are readily seen in the red blood cells on microscopical examination of stained blood films. In chronic or latent infection they are scanty. Treatment: Administration of tetracyclines give encouraging results.

ANTHRAX

An acute, febrile disease of virtually all warm blooded animals and men. Caused by Bacillus anthracis. Infection generally takes place through feed and water contaminated with spores of the bacillus. Symptoms: The disease may occur in a per-acute, acute or sub-acute form. Per-acute form is highly fatal with tarry blood oozing from natural orifices; in acute and sub-acute cases high fever, distress, trembling, staggering and convulsions occur. Death usually occurs before the symptoms can be detected.

Typical signs: The body of the animal is highly bloated with all the four legs stretched out, dark tarry blood is discharged from the nostrils, everted rectum and vagina. Diagnosis based on clinical signs may be difficult. The disease is diagnosed by microscopic examination of the stained blood smears. Treatment: Penicillin and tetracyclines are useful preparations, although no effective curative treatment is there. Prevention: The disease is effectively controlled by annual vaccination. In areas where the disease has no previous occurrence, it is best not to vaccinate the animals with live vaccine. The dead body should not be opened for post-mortem examination. It should be buried two metres below the surface, away from any dwelling, water supply, stream or river and a 15 cms layer of unslaked lime be put around the body.

BABESIOSIS

Also known as piroplasmosis, tick fever. A protozoan disease caused by Babesia bigemina and transmitted through ticks. Destroys red blood cells, resulting in coffee-coloured urine. Cross-bred animals are more susceptible, indigenous cattle are relatively resistant. Symptoms: Sudden high fever ranging from 40°C to 41.6°C with droopy look, loss of appetite, constipation, coffee-coloured urine and rapid decrease in milk production. Diagnosis: Confirmed by microscopical examination for the presence of the causal organism in stained blood film. Treatment: The sick animal be given berenil and trypan blue. Prevention: Pesticides be sprayed to destroy ticks on the animals and in the barns.

BLACK-QUARTER (BQ)

A bacterial disease caused by Clostridium chauvoei. Young calves are more susceptible. Symptoms: Sudden high fever, emphysematous swelling of subcutaneous tissues producing crepitating sound on applying pressure, animal becomes lame, prostrates and dies within 12 to 48 hours after the onset of symptoms. Diagnosis: Sudden death following the occurrence of localised swelling should cause suspicion for black-quarter. In positive cases, smears made from muscle exudate show typical clostridia and spores. Treatment: When detected early give high doses of penicillin intramuscularly. Prevention: To prevent the spread of infection and contamination of the soil with spores of the causal organisms, carcasses of the animals dead of black-quarter and contaminated litter should be either buried deep and covered with lime or cremated. The black-quarter vaccine protects animals against the disease for about a year and animals should be vaccinated about three weeks to a month before the onset of monsoon.

BLOAT

See tympany.

BRONCHITIS

Predisposed by cold, caused by bacterial or viral infection, or chemical irritants etc. Symptoms: Sudden rise in temperature, watery discharge from nostrils and eyes, laboured breathing, loss of appetite and decrease in milk yield. Treatment: Give antibiotics and sulpha drugs. Prevention: Keep the animal in warm, well ventilated surroundings, avoid exposure to cold wind and overcrowding.

BRUCELLOSIS

Also known as contagious abortion. A bacterial disease caused by Brucella abortus, communicable to human beings causing un-

dulant fever. Abortion usually occurs in the last three months of pregnancy. The infection mostly spreads through consumption of feed and water contaminated with genital discharge of the infected or aborted animal. Symptoms: Reduced milk yield; opaque vaginal discharge which may appear a short time before abortion. Retention of placenta; arthritis (swollen joints) are some of the complications. Diagnosis: Based on bacteriologic or serologic examination. Blood serum agglutination test is the standard method of diagnosing bovine brucellosis. Treatment: No effective treatment is known. Prevention: Adopt sanitary measures recommended for contagious and infectious diseases. Aborted foetus and soiled litter should be burnt. Brucellosis free herds can be raised by undertaking agglutination tests. The policy of test and elimination should be followed where the incidence of disease is less than 5 per cent. When it is more than 5 per cent wean calves at birth, raise them separately and practice calf-hood vaccination with 'Cotton strain 19'. In herds having more than 20 per cent reactors, vaccination of adult cows may also be undertaken.

CALF DIPHTHERIA

Infectious disease of calves affecting the throat, characterized by ulceration and swelling of the affected parts. Caused by bacterium Fuso-bacterium necrophorum. The disease usually affects weaned calves upto about six months of age, the infection being acquired from contaminated feeding pails. Symptoms: Temperature rises to 40°C to 41°C, painful coughing and difficulty in breathing, dribbling of saliva and inability to swallow feed. There is necrosis and ulceration of tongue, cheeks and hard palate. Necrotic area may extend to nasal cavity, larynx and trachea. Death may occur in 4-5 days. Diagnosis: The lesions are characteristic. Treatment in advanced cases is generally unsuccessful, but mild cases can be effectively handled by giving sodium sulfapyridine solution intravenously or orally. Broad spectrum antibiotics and vitamin B-12 are useful. Prevention: Affected animals must be isolated from the healthy ones. Cleaning and disinfecting the sheds is a must.

COCCIDIOSIS

A disease of the young calves caused by a protozoan parasite, Eimeria zuernii. Symptoms: The foul-smelling fluid faeces containing much blood and mucous are passed with considerable straining. The affected calf goes off-feed, becomes anaemic, emaciated and may die in a week or so. Diagnosis: Microscopic examination of the faeces. Treatment: Sulfamezathine gives good results. Symptomatic treatment for diarrhoea may be helpful. Attention to the principles of sanitation is necessary.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA (CBPP)

Highly contagious pneumonia accompanied by pleurisy. Caused by Mycoplasma mycoides. It is a chronic wasting disease with 10 to 15 per cent fatality. The susceptible cattle become infected by inhaling droplets coughed out by affected animals. It is confined to a few districts of Assam. Symptoms: Pneumonia and high fever, followed by death from asphyxia. In most cases, the acute stage gradually assumes a sub-acute or chronic form. The animal refuses to feed and develops a painful, husky cough with signs of pneumonia and pleurisy. The animal stands with head drooping down. In sub-acute cases death may occur in about two to three weeks but chronic cases gradually emaciate and die in about two months. Diagnosis: Made on clinical and post-mortem examination.

Treatment and Control: A national programme for eradication of CBPP is likely to be soon launched. The guidelines drawn under the programme should be followed.

COW-POX.

A viral disease, mostly of cows but sometimes buffaloes are also affected. Symptoms: Fever with appearance of red, slightly swollen specks which later turn into vesicles and pock lesions, mainly on the udder and teats of females and scrotum of males; spreads through milker's hands. Disease predisposes the udder to infection and mastitis. Treatment: The lesions heal by themselves in the normal course. Give symptomatic treatment to disinfect and protect the open lesions and relieve tenderness; segregate the affected cows and provide separate attendant to milk them; if not possible, attend to them after the healthy animals are milked.

CYSTIC OVARY

See reproductive disorders.

DIARRHOEA

Frequent expulsion of profuse loose watery faeces is termed diarrhoea. This is due to constant irritation caused by faulty diet, for example consuming mouldy feed and abrupt change from roughages to grains. Physical and environmental factors like exposure to cold and overwork sometime produce diarrhoea. A number of bacterial and viral diseases like haemorrhagic septicaemia, coli-bacillosis, Johne's disease and rinderpest, show diarrhoea as one of the symptoms. Gastro-intestinal parasites frequently cause diarrhoea. Symptoms: Animal stops feeding, becomes dull. Hind quarters are soiled with faeces, animal becomes dehydrated with sunken eyes, temperature lowered to sub-normal. Treatment: Depends on the cause. If of parasitic origin, treat with respective anthelmintics; if infectious in nature, treat with sulphonamides and antibiotics. Commonly used drugs are Strinacin, Sulphamezathine, Neftin, Streptomycin, Pectilin, Terramycin animal formula tablets, etc. The sick be given easily digestible food like barley water, gruel, linseed meal, boiled milk or syrup of bel fruit. Administer glucose-saline in dehydrated cases, avoid hard food, provide ample clean drinking water.

DYSENTERY

Caused by inflammation of intestines (enteritis) due to viral, bacterial, protozoan infections. Affected animals pass loose stools mixed with mucous and blood. Treatment: Give antibiotics and sulpha drugs. Give demulcents like rice gruel etc.

FASCIOLIASIS

Also known as liver fluke disease. A parasitic disease caused by a leaf-like parasite Fasciola gigantica/Fasciola hepatica, one of the major limiting factors in the improvement of cattle in marshy and waterlogged areas. F. gigantica and F. hepatica are found in cattle and buffalo. The former is very common in the plains of India; the latter is confined to the hills and the Deccan plateau. The incidence of the disease in Bihar, Andhra Pradesh, Orissa, Himachal Pradesh, Uttar Pradesh, West Bengal, Assam and parts of Madhya Pradesh is high. Symptoms: Liver fluke causes irritation and thickening of the bile ducts resulting in cirrhosis and atrophy of the liver, partial blockage of the ducts. The immature form causes destruction of the liver substance and haemorrhages; heavy infestation may damage the liver sufficiently to cause quick death of the animal. The clinical

symptoms are anaemia, emaciation, diarrhoea in later stages. Oedema under the jaw, ascitis and jaundice are frequently present. Treatment: Several drugs, efficacious against the fluke, include Hexacholorophane (Distodin) Zanil; Hexachlorethane and carbon tetra-chloride. Prevention and Control: Destruction of snails is important to break the life cycle of the parasite and control the spread of disease. Keep the cattle away from infested ponds and water logged areas. Examine the faeces of the animal periodically for eggs and treat accordingly.

FEVER

Rise of temperature above normal (in dairy animals 37.5°C is normal temperature). It is a symptom of many diseases, as a body reaction against invading pathogens. Depending upon the cause of the disease, fever in the early stages may be accompanied by shivering, off-feed condition, staring coat, drooping ears. To check rise in temperature, antipyretics, diuretics and laxatives are administered. Ice pack may be applied when temperature rises alarmingly.

FOOT-AND-MOUTH DISEASE (FMD)

A widespread viral disease caused by four distinct virus types — O, A, C and Asia-1 in India. Outbreaks occur throughout the country all the year round. It is more severe in exotic and crossbred animals with a high mortality rate amongst calves. The healthy animal gets infected through direct contact with the affected animal and indirectly through contaminated water, pastures, utensils, straw, hay and animal attendants. Suckling calves pick up infection from the infected mothers. The young calves can develop heart lesions and die. Panting may result in working bullocks, incapacitating them from doing hard work. Symptoms: Initially high fever, sluggishness, reduced feed consumption, profuse stringy salivation from the mouth, smacking of lips and formation of vesicles on the mucous membrane of the mouth and interspace between the toes and at the junction of skin and hoof, lameness, abrupt reduction of milk yield, abortion. Diagnosis: Quick spread and the occurrence of lesions in the mouth and feet of affected animals are its characteristic symptoms. Treatment: No therapeutic agent has been found to cure the disease. Ulcers developed on the feet and mouth can be effectively treated with application of antiseptics. A common drug for the lesions of feet is a mixture of coal tar and copper sulphate in 5:1 ratio. Mouth lesions are washed with potassium permanganate solution. Apply boro-glycerine on the affected area. Prevention: The disease can be controlled by vaccinating the animal with polyvalent FMD vaccine each year. Each individual calf must be vaccinated three times within first year of its life. The affected animal should be separated from the healthy ones; foot lesion should be covered with a bandage to protect from flystroke; the carcasses be buried with lime at a distance away from the farm.

HAEMORRHAGIC SEPTICAEMIA (HS)

Also known as pasteurellosis. A highly infectious disease, usually acute in nature and is caused by Pasteurella multocida. Outbreak generally occurs during early monsoon. The disease usually spreads from animal to animal by consumption of contaminated food and water. Symptoms: Disease appears in three forms: (i) acute oedematous form, in which an increasing, hot, painful subcutaneous swelling appears on the throat and neck regions. The swelling presses the respiratory organs; a loud respiratory

sound is produced which can be heard from a long distance. Rise of temperature is seen — 40°C to 41.5°C. Asphyxiation causes death within a few hours. Mortality is high in this form, about 70-90 per cent; (ii) pulmonary form, in which pneumonia is a prominent change, respiratory distress is acute and may be the cause of death; (iii) sub-acute enteric form, in which enteritis is seen, leading to mild diarrhoea, emaciation. In this form there is usually, no death. Diagnosis: Microscopic examination of blood smears and smears of fluid from the swollen parts would reveal bipolar organisms. Treatment: Early cases of the disease are amenable to treatment with sulphonamides, notably sulphamezathine in heavy doses or broad spectrum antibiotics. On account of short course of the disease and its termination in sudden death, animals are seldom available for treatment. Prevention: The disease is controllable by yearly prophylactic vaccination in areas where it is endemic. Animals above six months of age should be vaccinated with oil-adjuvant vaccine.

HYPERTHERMIA

Also known as heat stroke, sun stroke. Caused by prolonged exposure to hot humid environments, exertion and excitement and inadequate ventilation. Exposure to direct rays of the sun is another contributory factor. The disturbance of thermo-regulatory mechanism of the body causes the rise of temperature which is maintained at a level which is higher than the normal. As a result of fever, metabolic disturbances occur, which may cause excessive loss of water leading to dehydration, loss of sodium chloride in the body and sometime brain damage. If fever persists convulsion may occur. Treatment: Cool the animal with ice pack, cold soaks or dips. Convulsion be treated with sedatives or barbiturates. To normalize the heat loss mechanism and to stabilize the thermo-regulatory mechanism aspirin is given.

IMPACTION OF RUMEN

An acute or sub-acute indigestion of ruminants. It is an atonic condition of the fore-stomach induced by over-loading rumen with food or indigestible substances. Sudden change of feed from greens to hay, debility, paucity of water, advanced pregnancy are other causal factors. Symptoms: Loss of appetite, suspended rumination, constipated bowels. Treatment: Activate the rumen with massage with closed fists, kneading the abdomen from below upwards. Give oily purgatives followed by saline purgatives. Withhold food and keep clean fresh drinking water within easy reach of the animal.

INFERTILITY

Failure to procreate normally. Disturbances may occur in reproductive processes of either male or female resulting in reduced fertility. Its causes can be classified in four groups: (a) congenital and hereditary, (b) hormonal imbalance, specific and general diseases, (c) nutritional deficiencies, and (d) physical injuries. While congenital and hereditary causes are hard to treat, most other causes can be cured, if detected in early stages. The simplest way of avoiding animal getting into infertility is to detect the animal in heat and successfully breed it. The cases of silent heat can be detected with the help of teaser bulls, or by observing their behaviour in herd. If the animal fails to conceive after three successive heat cycles of average 21 days each, then it should be examined for identifying the cause of infertility and treated accordingly. Persistent infertility leads to sterility which tends to become incurable.

Even after conception there can be failures to successfully carry the embryo to calving stage. This may be due to embryonic mortality, abortion, and still births. (See also "abortion" and "reproductive disorders").

JOHNE'S DISEASE

Also known as Paratuberculosis. Caused by Mycobacterium paratuberculosis (commonly known as Johne's bacillus), a chronic infectious disease of ruminants characterised by progressive wasting and diarrhoea which at first is intermittent then persistent. There is gradual loss of weight. With few exceptions the disease is fatal. Symptoms: In females, the first symptoms generally manifest after calving; strain of parturition and lactation leads to clinical breakdown. There is no fever, the animal continues to feed, but consumes more water. It becomes anaemic with progressive emaciation, until death occurs due to exhaustion and dehydration. Diagnosis: Organism of the disease can be found on microscopical examination of the faeces and a pinch of rectal mucous membrane. Johnin test is of material aid in detecting cases of the disease. Treatment and Prevention: No treatment is known to be effective. It can be controlled by detection of the disease, segregation of the affected animal, avoiding infected pastures, disinfection of barns and weaning calves at birth.

KETOSIS

See acetonaemia.

LIVER FLUKE DISEASE

See fascioliasis.

MANGE

Caused by a variety of mange mites. Symptoms: Reddening of skin on the affected areas, rough coat, irregular patches denuded of hair on the skin which is thickened and rough, sometimes marked with abrasions and sores. The lesions usually appear first on the upper aspect of the body from the root of the tail to the poll, including the withers and back, from where they gradually spread to the sides of the trunk and neck. Treatment: Application of golden lotion is effective. 0.5 per cent emulsion of malathion, DDT for spray are also effective. Himax, Teeburband Pestoban are also very effective herbal preparations. Precautions: Keep the animal clean, groom regularly, isolate the affected animals, prevent the animal from rubbing the affected parts; and treat the whole herd after treating the affected animals.

MASTITIS

Inflammation of mammary glands of the udder by multiple causes, such as bacterial, viral or fungal pathogens. Major causal organisms are pathogenic streptococci, staphylococci, corynebacterium. Factors that predispose to the establishment of infection are insanitary, wet/muddy conditions, injury to the teats, wrong milking techniques, and poor milking hygiene. High-yielding animals are more susceptible to the disease. Symptoms: In per-acute cases great swelling, heat, pain and abnormal secretion of the gland are accompanied by fever and other signs of systemic disturbances. In acute cases, similar changes in the gland occur with only slight to moderate fever. In sub-acute cases, changes in the gland and secretion are less marked. In sub-clinical cases the inflammatory reaction within the gland is only detectable by indirect tests. Diagnosis: Based on (1) cli-

nical signs, (2) culture and identification of the mastitis pathogens from the sample of milk collected aseptically and (3) results of test designed to detect increase in leukocyte count of milk (in sub-clinical cases). Treatment: Early detection of the disease helps in the treatment. Broad spectrum antibiotics can be successfully used intramammary to treat early cases. Prevention: The disease can be controlled through general sanitation in the shed, hygienic and correct milking methods, periodic examination of milk of all cows, and treatment of the affected animals.

MILK FEVER

Also known as parturient paresis. The term 'milk fever' is a misnomer. Actually, fever is never a symptom of this disease. Milk fever is a metabolic disease. It is a clinical condition characterised by animals lying prostrate, loss of consciousness leading to coma in dairy cows that have recently calved. The incidence is more common in high-yielding animals. If the disease is not immediately treated, the animal dies in a short time. It is attributed to acute calcium deficiency in the blood. The animal is usually attacked within 72 hours of calving. Symptoms: In the beginning the animal shows excitement, restlessness and muscular twitching. The animal staggers and lies down on the ground with neck, invariably turned sideways and the head resting on the chest; the animal loses consciousness and there is paralysis of the hind limbs, complete loss of appetite, anxious expression of eyes, muzzle dry, ears droop, temperature reduced to subnormal, teats and extremities are cold. Diagnosis: Uncomplicated cases are easily diagnosed but sometimes confused with similar syndromes, exhibited by cows suffering from septic metritis, mastitis and acute indigestion. Treatment: Give injection of calcium borogluconate, Mife intravenously. Skelemin M is a new effective product. Give adequate quantity of calcium in the ration.

NAVEL-ILL

Caused by bacterial infection of the navel of the newly-born calf due to contamination of the raw navel on account of filthy surroundings. Symptoms: Swelling of the navel with foul smelling pus, accompanied by fever and diarrhoea. The infection may affect liver and joints; the affected joints get swollen, hot, tense, painful and stiff. Treatment: Antibiotics intramuscularly. Precautions: When about to calve, the cow should be removed to a clean place which has been thoroughly disinfected. Clean the umbilical cord of the new-born calf with cotton soaked in tincture of iodine and tie it with a tape soaked in iodine; place a calf in a clean pen until the navel cord has dried and fallen.

NUTRITIONAL DEFICIENCIES

Nutrition plays an important part in the maintenance of health. It directly affects the animal's ability to grow, produce and reproduce. Faulty nutrition impairs the productivity of the animal, even to the extent that its health is affected. If an animal feed is deficient in respect of an essential nutrient and the feed is consumed for a sufficiently long period of time, a deficiency syndrome will result. Such syndromes are called deficiency diseases. Majority of Indian cattle suffer from malnutri-

tion due to lack of adequate nutrients. The animal shows poor appetite, emaciation and unthriftiness. The following are main nutritional deficiencies:

- calcium and phosphorus deficiency: Both the minerals are concerned with bone and teeth formation in the young calves and also for the maintenance of normal blood calcium level to meet the requirements in adults. The deficiency causes rickets in the young and osteomalacia in the adults. Milk fever is caused in high-yielding cows after parturition due to acute metabolic calcium deficiency. Treatment: By feeding calcium and phosphorus supplemented with vitamin D in ration. In milk fever inject calcium borogluconate.
- magnesium deficiency: Magnesium is closely associated with calcium and phosphorous metabolism in the body and is an essential component of teeth and bones. Deficiency causes tetany, deranged consciousness, incoordination and paresis. Spasm and convulsions are pronounced in case of severe deficiency. Additional signs are inappetence, fright and depression. Treat with salts of magnesium, calcium and phosphorus. Control: By treating pastures with magnesium salts and adding magnesium sulphate to the cattle feed.
- sodium chloride deficiency: It causes depraved appetite, decreased milk production, loss of weight, occasional shivering and irregular heart action. Supplement cattle feed with common salt or use salt bricks.
- cobalt deficiency: Cobalt is essential for the rumen microflora to synthesize Vitamin B-12 which is required for blood formation. Deficiency causes loss of appetite, unthriftiness, emaciation, dry hair coat, loss of milk production and anaemia. Supplement the feed with suitable mineral mixtures.
- iron and copper: Iron deficiency can be observed in young calves kept on restricted all-milk diet resulting in anaemia and poor growth. Copper deficiency can be caused by soil deficiency and excess of molybdenum resulting in severe diarrhoea, rapid weight loss, depressed appetite, hair discolouration, anaemia and reproductive disorders — infertility, retained placenta and birth of calves with congenital defects. Treat with 2 gms of copper sulphate in daily ration.
- iodine deficiency: Lack of iodine in ration can result in the birth of weak calf with considerably enlarged thyroid gland. To prevent it, feed iodised salt to pregnant mothers.
- zinc deficiency: It causes itching of skin and fall of hair. Give 0.5 gm of zinc salt — sulphate, chloride or oxide per 400 kg body weight.

ORCHITIS

See "reproductive disorders".

PARASITIC DISEASES

A parasite is an organism that lives on the skin or the body of another animal — host of a different species. The parasites that live on the body of the host are known as ectoparasites (eg, mange mites, ticks and lice etc), and those that live inside the body are called endoparasites (eg, round worms, tape worms, and flukes etc). The digestive tract of the animal is inhabited by many species of parasites. For example, Fasciola hepatica infects the liver of its host, and Sarcoptic scabiei the skin of the host. Listlessness and anaemia are common to most of the parasitic diseases. Depending on the severity of infection, the disease may run a chronic course or end in mortality. Diagnosis: Pathological examination; the external para-

sites causing scabies are diagnosed by examination of skin scrappings. Prevention: An effective check can be kept on the parasitic diseases by removal of the host from the infected pastures, elimination of intermediate host, maintaining sanitary conditions and regular dosing with effective drugs. Control parasitic infestation through regular faecal examination and medication.

PNEUMONIA

In a large breedings herd, calf pneumonia is a common problem leading to heavy toll. Caused by faulty hygiene, it usually occurs at night when there is a sudden fall in temperature accompanied by high wind or stagnant air during warm humid period; chilling from open doors and windows. Multiple type of bacterial infections like streptococci, staphylococci, pasteurella, corynebacterium, mycobacterium, mycoplasma, and inhalation of chemical irritants are responsible for this disease. Calves in the age group from 3 weeks to 8 weeks are more susceptible. Symptoms: Rise in temperature, breathing is faster and difficult, cough is dry and painful in the beginning but later on becomes soft and moist; mucous membranes get congested and eyes become dull and then watery and mucous like discharge comes from the nostrils. Treatment: Give sulphonamides and antibiotics. Avoid exposure to sudden cold and overcrowding; keep animal in neat, clean and dry surroundings.

PROLAPSE OF UTERUS OR VAGINA

Generally a post-calving complication. Uterus or vagina gets inverted or thrown inside out and hangs down through the genital opening. The animal becomes dull, depressed and the mucous membranes pale. Avoid unhygienic handling during parturition, keep the animal in healthy surroundings, raise and keep the hind quarters of the animal at a higher level. Clean the surface of the inverted organ with water containing potassium permanganate lotion. Do not rub the uterus while washing but merely let the water run over it. Seek veterinarian aid to put the organ back into its position. Fix a truss on the animal to prevent the organ coming out again.

PYOMETRA

Also known as suppurative metritis. Caused by post-calving infection or coitus with an infected bull. Multiple type of organisms cause this condition. It can lead to septicaemia/toxaemia and death or it may become chronic. The animal becomes sterile. Treatment: Give antiseptic douche or broad spectrum antibiotics. Use pessaries for placing in uterus.

RABIES

A fatal viral disease of central nervous system and salivary glands. Transmitted through bite of rabid animal usually canines and felines. It causes an acute encephalomyelitis. Symptoms: Incubation period is 15-20 days or more. There is rise of temperature, loss of appetite, abrupt cessation of lactation, depression, has a tendency to attack and bite other animals or human beings. Excitement continues for a day or two, animal cannot swallow food or water, becomes prostrate and invariably dies. Diagnosis: Based on the history of the bite and symptoms; confirmation through laboratory examination of brain tissues. The disease is not amenable to curative treatment. It is advisable to cauterize the site of the bite with strong acid, such as nitric acid to kill or inactivate the virus. If the area of wound is large it should be washed with a concentrated solution

of soap and painted with iodine tincture. Give 14 injections of anti-rabies vaccine.

REPRODUCTIVE DISORDERS

Caused by congenital anomalies which may be hereditary or may result from the effect of some toxin or infectious agents. Also caused by environmental factors such as deficient feeding, managerial neglect and exposure to diseases. This group of diseases is of utmost economic importance. Many of them can be corrected through regular checkups and proper treatment for the optimum functioning of the reproductive organs during the growth and productive period. For example the first check, after calving, is between 20 to 40 days for involution of the uterus. This is followed by another check for effective heat (conception) within 60 to 90 days after calving. The diagnosis for pregnancy is made between 30 to 40 days and confirmation around 90 days after insemination. Any failure to conceive needs thorough investigation. Some major reproductive diseases are given below.

- orchitis: Inflammation of testicles may occur because of trauma, spread of infection from urinary tract or spread through blood, etc. Treatment: According to cause. Such animals are not desirable for breeding purposes.
- ovary cystic: It occurs when ovulation fails to occur. Ovulation takes place after the rupture of the ovarian follicle as a result of hormonal activity. In some cases, the follicle fails to rupture and becomes covered with fibrous tissues. Symptoms: Excessive and irregular heat. It is detected with manual palpation of ovary. It results in infertility. Treatment: Rupturing follicle sometime helps. Hormonal therapy may also be useful.
- ovary non-functional: The ovary may be under-developed or non-functional due to prolonged malnutrition during the growth period. Essentially, it is a disease most frequently found in rural cattle and buffaloes with a complaint that the animal, inspite of maturity, does not come into heat.
- persistent corpus luteum: A condition of non-pregnant animals, inhibiting the formation of new follicles into ova. Normally, corpus luteum develops in the ovary after the rupture of follicle and helps in the maintenance of pregnancy. In the absence of pregnancy, the corpus luteum regresses but sometime corpus luteum persists even in calved cows, thus inhibiting the development of new follicle. Treatment: By manual enucleation.
- retention of placenta: Placenta is a bag that establishes contact with uterine wall of the mother for exchange of blood and other metabolic products with the embryo; it is generally expelled within 4-5 hours of calving. Retention may be caused in case of abortion, weakness of uterine muscles or some chronic lesions in cotylendons. In typical cases, a part of the placenta hangs out from the genital opening; there is a chocolate-coloured discharge with foul smell. The animal gets uneasy and the milk yield goes down. Precautions: Clean the hind quarters of the cow with warm water and take care that the hanging part of the membrane does not get entangled. Do not apply force to take it out. In case placenta is retained for more than 24 hours, douche and remove with gentle manual manipulation. Give antibiotics to ward off infection. Seek veterinary aid.
- salpingitis: The inflammation of the fallopian tube is called salpingitis. It may result from the spread of infection from

uterus or in some cases from tuberculous peritonitis. Treatment: It is of little practical value. Chronic salpingitis results in sterility.

RINDERPEST

Also known as cattle plague. An acute, viral, highly contagious and fatal disease of cattle, buffaloes and other ruminants. Exotic and hill cattle are more susceptible. Symptoms: High fever, congestion of mucous membranes, ulcers on gums and lower surface of the tongue, eyes red with thick yellowish discharge, shooting bloody diarrhoea, sometime accompanied with eruption on the skin. High death rate. Diagnosis: Symptoms help in diagnosis. Treatment: No treatment but sulphonamides and antibiotics may be of some help to keep down secondary infection. Freeze dried goat tissue rinderpest vaccine may be used for indigenous cattle and buffaloes and freeze dried rinderpest tissue culture vaccine for exotic/crossbred/upgraded cattle for prevention of the disease.

RINGWORM

A fungal disease. It derives its name from the fact that in its typical form the infection spreads centrifugally in the form of an ever-widening circle. Symptoms: The initial lesion starts as a raised ring-like patch with hair standing erect. The lesions, when well developed, consist of greyish white, dry and crusty round masses formed by the confluence of many lesions. There is constant itching and the animal rubs the affected part against various objects. Treatment: The disease has a tendency to disappear spontaneously. However, curative treatment is effective. The area around the lesion should be cleaned and all the hair and crusts removed after softening with soap. If the lesions are few apply tincture of iodine. Give Griseofulvin orally and application of Tinaderm is found effective.

STERILITY

See infertility.

STOMACH FLUKE DISEASE

See amphistomiasis.

STRESS

A situation in which the animal's normal life balance or equilibrium is upset. The source of stress is after a complex situation involving a number of factors. To mention a few: overcrowding during summer, ill-ventilation, exposure to extremes of temperature, resting discomfort, rough handling, milking injury, delayed or irregular milking of high yielders, drastic feed change, faulty nutrition. These and other related factors can be avoided through proper supervision.

SURRA

Caused by a blood protozoan parasite Trypanosoma evansi. The disease is transmitted mechanically by stable fly or Tabanus fly. It runs usually a mild course in cattle and buffaloes but an animal may occasionally be affected with an acute attack resulting in death if not treated. Treatment: Antrycide, antrypol, berenil.

THEILERIASIS

Caused by a blood protozoan parasite Theileria annulata. The infection is transmitted by ticks. Symptoms: High fever, weakness, swelling of superficial lymph glands, nasal discharge,

lack of appetite. Exotic and crossbred animals are more susceptible. The infection may cause death. Diagnosis: Microscopical examination of blood and of the material drawn from the enlarged superficial lymph nodes. Treatment: No satisfactory treatment available, but berenil, antibiotics and quinine products are useful. The disease can be controlled through eradication of ticks.

TICK FEVER

See babesiosis.

TRAUMATIC RETICULOPERITONITIS

Also known as traumatic gastritis or "hardware" disease. A disease of cattle resulting from the perforation of the reticulum and sometimes the rumen by a sharp object. Foreign objects reach the stomach of cattle because they are greedy eaters and swallow the feed without mastication. Causes: Swallowed metallic objects, such as nails or pieces of wire, which fall directly into the reticulum. The foreign objects may pierce the wall of the reticulum and its overlying peritoneum resulting in the contamination of peritoneal cavity. The object may penetrate the diaphragm and enter the thoracic cavity causing pleuritis and pneumonia. The initial attack is characterised by a sharp fall in production in lactating cows. The animal may exhibit an arched back, an anxious expression, reluctance to move and an uneasy cautious gait. Forced sudden movement and acts of defecation, urination and lying down may be accompanied by groaning. Diagnosis: In early stages traumatic gastritis is not always readily distinguishable from peritonitis. Treatment: In the early stages the disease can be treated by surgical operation; for example rumenotomy with manual removal of objects. Precautions: Avoid the use of baling wire, and keep animal away from the sites of new constructions etc.

TRICHOMONIASIS

An infection of the reproductive organs of both male and female by protozoan parasite, Trichomonas foetus. It spreads through bulls used for natural service. Infection causes breeding difficulties through low conception, early abortion and pyometra. Control depends on treatment of the infected animals, suspension of natural service and replacement with artificial insemination. Infected cows should be given breeding rest for five to six months. Infected bulls should be discarded.

TUBERCULOSIS

A bacterial disease caused by Mycobacterium tuberculosis. It is chronic wasting disease with tubercle formation in various parts of the body, like lungs, pleura, intestines, liver, spleen, lymphatic glands, udder etc. Symptoms: In early stages of the disease, when the lesions are localized, the animal hardly shows any symptoms, except a general malaise. When the lungs get involved, there occurs intermittent or remittent fever with a dry husky cough and gradual emaciation. There is persistent diarrhoea when the intestines get involved. With the disease extending to the udder, a hard painless enlargement of the gland occurs, usually in one of the hindquarters, lesions being diffuse or nodular. The consistency of milk is affected, and it becomes watery, with large number of tubercle bacilli in it. The duration of the disease ranges from a few months to a few years. Diagnosis: In early stages of the disease the clinical symptoms are not diagnostic. Diagnosis is through microscopic examination

of sputum, milk and faeces. Tuberculin test is dependable for detecting the infected cases in the herd. Treatment and Control: Treatment of tuberculosis is of little value in animals. Control through segregation of the affected animals, weaning calves immediately after calving and rearing them separately as a clean herd.

TYMPANY

Also known as bloat. Caused by excessive fermentation of succulent feed in the rumen. Symptoms: The left side of the abdomen is bloated, animal gets uneasy, stamping and peddling of hind legs, difficulty in respiration. Treatment: Massage the abdomen, give carminatives like ginger, asafoetida, turpentine oil mixed in linseed oil followed by magnesium sulphate and sodium sulphate. Withhold all food till the acute stage is over and give water in small quantities only; in severe condition puncture the rumen by a trocar and canula or by plugging a sharp knife deep through the middle point in the left hollow of the flank. Avoid succulent and starchy feeds.

WHITE SCOUR

A bacterial disease affecting calves within the first three weeks of life. Diarrhoea is a prominent symptom. It is caused by E. coli. The disease results from bad management. Certain predisposing factors are unhygienic conditions, withholding colostrum, malnutrition of the cow during pregnancy, faulty method of feeding and overfeeding of calves soon after birth. This is a disease where preventive measures are of utmost importance. Symptoms: The affected calf has a rise in temperature before showing scours; shows dullness, restlessness and dislike for food. Within 48 to 96 hours, a profuse yellowish-white diarrhoea with pungent odour starts. The calf develops a dry and rough skin, cold limbs and sunken eyes. There is rapid emaciation and coma, followed by death in a day or two. The joints are swollen (joint-ill) and there are signs of pneumonia. Diagnosis: Symptoms are quite typical. Bacteriological examination determines the exact cause of the disease. Treatment: During early stages of diarrhoea, feed may be reduced or stopped for a day or so. Calf be given lukewarm boiled water with 1 gm salol or tannin added to it. Later milk diluted with lime water be given. Two phthalylsulphathiazole tablets of 4g each should be given three times a day. Antibiotics such as oxytetracycline or streptomycin are recommended. Precautions: Observe strict hygienic and sanitary measures; remove all healthy calves away from the sick and keep them in clean ventilated pens.

Guidelines for Early Detection of Impending Diseases



Marked changes in the behaviour of the animal occur before the onset of any disease. To forestall and control the impending disease, it is necessary to keenly observe the behaviour of the animal in relation to its herd-mates under different situations. The following are a few guidelines for observing the animals:

I. Visit the dairy herd or milch animals at the time of milking and feeding in the morning and evening to observe:

- the general response of the milch animal to the noise of milking utensils and the attendant's movements around while preparing for milking. Some animals may be lethargic and dull to respond in getting up and stretching themselves to activate their limbs. Check temperature for further observations.
- the nature and consistency of dung voided at night in the paddock or cattle shed:
 1. Small ball like structures rolled together in one mass and thinly covered with slimy mucous. Suspect constipation.
 2. Loose big mass of dung, circular in shape with a depression in the centre — it is generally normal dung of the buffalo, could be of a high-yielding cow. The presence of small pits all over the mass of dung is indicative of fermentation in large intestines leading to indigestion.
 3. Dung loose, fluid in consistency and spread all over the ground. The affected animal would have dung smeared around the anus or along the perineum (portion lower to the anal opening). Suspect diarrhoea.
 4. The presence of indigested fibre pieces in the dung. Suspect indigestion.
 5. The presence of small quantity of mucoid or pus like discharge around the normal dung or without the presence of discharge; the flies circle around the spot. Possibility of pus due to either metritis or vaginitis.
- Shiny, clear mucous discharge sticking on the inside of the tail or around the vulval opening. Possibility of the animal coming in heat/oestrus.
- The staring coat with hairs erect, dull look, ears drooping, muzzle dry, dull movement. Check temperature for any impending sickness; keep close watch on the animal. (Normally the animal would move of its own upto the place where it is usually milked).
- As soon as the milker splashes water on the udder and massages it, the animal would normally respond spontaneously by urination. The udder and teats are full with milk. Any delay in this process or the animal showing anxious look, fear or hesitation in giving its milk and feels uneasy with twitching of hind legs when udder is sucked by the calf or handled by the milker, it is a sign of concern. Leave the animal alone for some time to calm down so that the nervousness or fear may be overcome. If it persists to behave in the same way, suspect mastitis. Use strip cup for finding small curd particles in the first few strips of milk from each teat.
- If there is sluggishness in eating the concentrates while the animal is being milked or it stands quiet without eating, watch the animal closely, record temperature, watch the posture/position, feel the left hollow of the flank for ruminal movements.
- If the animal refuses to be milked, leave it alone for some time so that its nervousness or fear may be overcome and it calms down. If it persists, then suspect mastitis or onset of heat.

II. Observe the animal in the company of its mates while moving out together:

- Watch the general condition of the herd: the gloss, the look and general alertness of the animals.
- Any sluggish looking, limping animal or moving with unusual posture be spotted and checked.
- It is at this time the animal with silent heat feels free to move close to its friendly mates, lick them and jump on them. Possibility of the animal coming in heat.
- String-halt movement of the leg generally in one of the hind ones — usually seen on the first move in the morning. The leg does not bend freely and when it does, it moves forward with a jerk. Get it examined. The cause of lameness may be on the opposite leg, which may be sprained, or there is sharp object in the inter-digital space.

III. Visit again at night once or twice a week when the animals are resting either in the shed during winter or in the open during summer, without in any way disturbing them. Most of them would be sitting and ruminating and breathing freely, which is quite audible in the calm and quiet surroundings. Watch for such abnormalities as:

- Any abnormal breathing: Rattling sound due to mucous in bronchioles, check for chest troubles; obstructed breathing — obstruction in the nasal passage.
- Some animals may be standing while the others are resting and ruminating — watch their posture, particularly the hollow of the left flank: Drum-like sound, suspect impaction.
- Coughing sound in between breathing — poor condition and mild temperature. Suspect tuberculosis.

IV. Visit the herd once or twice a week, while grazing in the field, and watch from a distance. Some animals may be standing alone in the shade most of the time while the others are grazing. If repeatedly seen, record temperature. May be suspected of hyperthermia. ■

Vaccination Guide

Vaccination is one of the more effective ways of preventing specific diseases by building up immunity in the animals. Not all vaccinations, however, impart lifelong immunity. So it is important to know the period of immunity, the age at which the animal must be vaccinated, the dosage and route of vaccination and the storage conditions for stocking vaccines. For making the vaccination programme effective, the following guidelines may be helpful.

- Perform vaccination in healthy stock. Suitable treatment for any abnormal conditions would be beneficial before vaccination.
- No vaccination programme should be carried out during any outbreak of disease. The attendants and fomites carry infection from the diseased animals to a healthy flock.
- Keep all vaccines under refrigeration until ready to use. At the time of vacci-

nation, the reconstituted vaccines, particularly the live viral vaccine, should be kept on ice. Follow manufacturers directions carefully.

- Destroy all the empty bottles and unused vaccines. Saving left-over vaccine is a dangerous practice. Immunizing ability of a vaccine can be readily lost in a short time. Clean up and disinfect all equipment and clothing after the vaccination job is over.
- For the success of any immunization programme it is advisable that vaccination is performed by trained and qualified personnel.
- Keep a record of the brand, kind and batch number of vaccines used.

A vaccination schedule is given in the table on the following pages. This schedule is only a guide. It must be tailored to meet specific needs and local conditions. The advice of veterinarian must be followed.

TABLE 57. Vaccination schedule for dairy animals.

Name of the disease (1)	Name & source of vaccine (2)	Age at which vaccination is desired (3)	When to repeat (4)	Duration of immunity (5)	Remarks (6)
Anthrax	Anthrax Spore Vaccine (live); IVRI & State Biological Products Stations	Calves at six months. Dosage: 1 ml subcutaneously (S/C). Time of vaccination: May-June.	To be repeated in adults every year in endemic areas.	One year	Vaccination is advised in areas where anthrax prevails endemically. Since the vaccine consists of live spores, it should not be used by persons who have abraded skin on their hands. After use; the hypodermic syringes and needles should be sterilized for one hour in boiling water.
Black Quarter (BQ)	Polyvalent B Q vaccine; IVRI & State Biological Products Stations	Calves at six months and above. Adults - upto 3 yrs Dosage: 5 ml S/C Time of vaccination: May-June.	To be repeated one month prior to the onset of monsoon every year.	One year	A second vaccination at the same dose may be carried out 10 days after the first inoculation in cases where high degree of immunity is considered essential.
Brucellosis in indigenous animals	Calfhood vaccine: "Cotton Strain-19" IVRI & State Biological Products Stations	At six months to a year. Dosage: 5 ml S/C	Not necessary to repeat in a herd where calfhood vaccinations are practised and serologically positive animals are culled.	Lasts upto two pregnancies.	Males for breeding purposes are not to be vaccinated. Avoid vaccinating advanced pregnant and recently calved animals. In a herd where incidence of brucellosis is less than 5 per cent, vaccinations are not advocated. Serologically positive animals should be eliminated and strict hygienic measures taken to control the disease. Where incidence of abortion due to brucella is more than 5 per cent of all animals in the herd, vaccinations should be practised. In herds having more than 20 per cent incidence, vaccination of adult cows should be undertaken.
Foot-and-mouth disease (FMD)	IVRI: Polyvalent cell culture FMD vaccine	Calves 5 month of age. Give 5 ml of polyvalent FMD vaccine. S/C at brisket re-	These calves should be given 10 ml of adult dose		

TABLE 57. (contd) Vaccination schedule for dairy animals.

Name of the disease (1)	Name & source of vaccine (2)	Age at which vaccination is desired (3)	When to repeat (4)	Duration of immunity (5)	Remarks (6)
Foot-and-mouth disease (FMD) (contd)					
		gion, followed by repeat dose after 21 days.	at one year of age. Repeat vaccination every year.		
	Indian Immunologicals (A unit of IDC, manufactured by NDDB): FMD vaccine, 'Raksha'.	At four months of age; dosage: 3 ml, followed by a booster dose after 2-4 weeks.	One dose every six months after the booster shot.	Six months after booster dose.	A quadrivalent vaccine, incorporating FMD type O, A-22. C and Asia-1 strains of viruses, selected from recent disease outbreaks.
	Hoechst: FMD vaccine.	Give 10 ml dosage S/C at the age of 4 weeks followed by repeat dose after six weeks.	Give 10 ml S/C at the age of one year and repeat annually.		
	BAIF: FMD vaccine.	4-6 months old animals; give 10 ml dosage S/C, followed by repeat dose after six months.	Annual vaccination.	One year	
Haemorrhagic septicaemia (HS)	H S vaccine (oil adjuvant): IVRI & State Biological Products Stations.	Calves: Six months and above are vaccinated.	Annual vaccination.	One year	Vaccinate one month ahead of monsoons. A gentle massage should be given at the site of inoculation after withdrawing the needle.
		Adults of any age: Vaccinate one month ahead of monsoon.	Annual vaccination.	One year	

TABLE 57. (contd) Vaccination schedule for dairy animals.

Name of the disease (1)	Name & source of vaccine (2)	Age at which vaccination is desired (3)	When to repeat (4)	Duration of immunity (5)	Remarks (6)
Haemorrhagic septicaemia (HS)	Broth vaccine: State Biological Products Stations.	Calves six month old and above. 5 ml S/C for calves. 10 ml S/C for adults.	Annual vaccination.	One year	
Rinderpest:	Freeze dried Rinderpest goat-adapted vaccine.	Calves: At the age of 6-8 months to be followed after 12 months.			Vaccination should be done as per instructions given by the manufacturer.
In indigenous cattle and buffaloes	IVRI & State Biological Products Stations. Regional Goat Tissue Vaccine Laboratories.	Adults: Of any age.			Vaccination should be done as per instructions given by the manufacturer.
In exotic/crossbred/upgraded animals	Freeze dried Rinderpest calf kidney tissue culture vaccine. IVRI & State Biological Products Stations.	Calves: At the age of 6-8 months to be followed after six months. Adults: Of any age.			Vaccination should be done as per instruction given by the manufacturer.
					Vaccination should be done as per instructions given by the manufacturer.

Sources: 1) Indian Veterinary Research Institute, Izatnagar.
2) NDRI Handbook (Production), 1979.

TABLE 58. Control of parasitic diseases.

The effective control of parasitic diseases requires a thorough two-pronged attack — one, the treatment of the affected animals, as given in the table below; and second, the treatment of the intermediate hosts as given in the Table No 53. The latter is essential to break the life-cycle of parasites so that the animals do not get infested. The grazing land should be kept free from animals for at least three months to destroy infective larvae. One important step is to ensure sanitary conditions in sheds. The dung should be disposed off in compost pits so that grazing areas do not get infested.

Name of parasites	Therapeutic agents	Dose & mode of administration	Remarks
Nematodes (Roundworms)			
Ascariasis	Helmacid liquid (Glaxo) (piperazine hydrate) Piperazine Adipate (ICI) Vermex (Pfizer) (Piperazine hexahydrate)	4 ml/10 kg body wt orally 200-400 mg/kg body wt orally 0.5 ml/kg body wt orally	To be repeated after every 20 days upto 6 months after the first dose given at about one week of age.
Strongyles (Gastro-intestinal parasites and lung worms)	Thiabendazole (MSD) Thiabendazole (MSD) Nilverm (ICI) (Tetramisole) Banminth II (Pfizer) (Moromtel Tartrate)	50-80 mg/kg body wt orally 50-100 mg/kg body wt orally 15 mg/kg body wt 10-15 mg/kg body wt orally	To be repeated every month, after the first dose at 30-40 days of age, till one year of age, except in summer (April to June).
Other potential worms and Oesophagostomum	Phenovis		
Trematodes (Flukes and Amphistomes)			
Liver flukes (Fasciola species)	Distodin tablets (Pfizer) (Hexachlorophen) Carbontetrachloride Avlothane (ICI) (Hexachlorethane) Zanil (ICI) (Oxyclozanide)	10-15 mg/kg body wt orally single dose 100% effective 1.0 ml/50 kg body wt orally 200-500 mg/kg body wt or 15 gm for calves of 6 months	This disease being of seasonal occurrence the treatment should be given during the season to the whole herd; in endemic areas it is given at monthly intervals between December and March.
Amphistome (Stomach flukes)	Zanil (ICI)	30 ml/100 kg body wt (not more than 100·ml)	As per manufacturer's instructions
Cestodes			
Tapeworms	Taenil (Indian Herbs) Wopell (Indian Herbs)	Calf 10-12gm Adult 60gm Calf 15gm Adult 60gm	Repeat after 20 days for three times

Notes: To calculate the actual doses of deworming medicine the following average body wt for varying ages is given for guidance. 1-5 days of age, 25-35 kg; one month, 35-45 kg; two months, 50-60 kg; three months, 60-70 kg; four months, 70-80 kg; five months, 80-100 kg; six months, 90-110 kg; and six to twelve months, 100-180 kg. Reference to commercial products or trade names is made to facilitate understanding. No discrimination or endorsement is intended.

TABLE 59. Deworming programme for calves.

Body weight (kg)		1st day	Colostrum every 8 hours
		2nd day	Colostrum every 8 hours
		3rd day	Colostrum every 10-12 hours
		4th day	Colostrum every 10-12 hours
25-35	Sulmet	3rd day	30 ml or 2 tablespoons
25-36	Sulmet	4th day	15 ml or 1 tablespoon
26-36	Sulmet	5th day	15 ml or 1 tablespoon
28-40	Piperazine	7th day	5 gm
35-45	Sulmet	1 month	45 ml or 3 tablespoons
45-50	Piperazine	1½ month	10 gm in two instalments
55-65	Piperazine	2½ month	10 gm in two instalments
60-75	Phenovis	3½ month	9 gm or 2 tablespoons
65-85	Sulmet	4 month	90 ml or 6 tablespoons
70-100	Piperazine	5 month	15 gm in two instalments
75-110	Phenovis	6 month	13-18 gm or 3-4 tablespoons
85-125	Piperazine	7½ month	20 gm in two instalments
100-140	Phenovis	9 month	18 gm or 4 tablespoons
130-180	Phenovis	12 month	18 gm or 4 tablespoons

TABLE 60. Vector* control measures.

percentage

Insecticides	On animals		In shed in solution
	In solution	Dusting powder	
Malathion	0.5	4-5	0.5
DDT	0.5	10.0	0.5
BHC	—	0.05	—
Sumithion	0.5	—	0.1
Lindane	0.25	1.0	0.25
Sevin	0.8	—	0.8
Pestoban (Herbal)	2.5	—	2.0

*Any organism (usually an insect) which is a carrier of a disease-producing microorganism which it transmits from one animal to another, thus spreading the disease.

Note: All the above mentioned insecticides are toxic in nature, except the last. So attend to individual animals to avoid poisoning by licking and other toxic hazards. Adequate dosage of atropine sulphate should be kept in ready stock for the treatment of animals showing signs of toxicity. Animals, meant for meat, should be slaughtered at least 30 days after the treatment.

Source: Dairy Handbook (Production), 1980, NDRI, pp 20 and 145.

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Preventive Maintenance of Dairy Equipment

Preventive maintenance of dairy equipment is a procedure meant to increase plant productivity, decrease maintenance and operation costs and lengthen the productive life of the plant and its equipment. The aim is to prevent the "unscheduled shutdown". The modern mechanised operations of dairy industry demand a highly developed and expertly executed maintenance programme. Two important facts are that some of the processing equipments are imported and so spare parts are difficult to procure; and secondly, the dairy equipments are expensive and they need to be properly maintained to extend their productive life.

General Principles

- Follow the instructions of the manufacturer regarding the operation, daily and periodical maintenance, cleaning and sanitization of the equipment.
- After use, the equipment should be cleaned with the safe detergent followed by sanitization.
- Lubricate all moving parts with suitable lubricants. Lubricating oil should be free of moisture and replaced at proper interval.
- Use soft water.
- Keep the plant floors dry.

Buildings

- Periodic inspection of fire protection equipment and alarms.
- Clean roof, windows, shutters, doors at regular intervals.
- Clean out grease traps regularly.
- Inspect for rodents & insects regularly.
- Keep factory surroundings clean & tidy.
- White-wash once a year or oil paint once in two years.

Pumps

- Check lubrication of pumps..
- Ensure that direct drives are maintained in axial alignment.
- Check belt tension and alignment of separate drive pumps.
- Check leakage for seal condition.

Electrical motors

- Enemies of electric motors are: dust, stray oil, moisture, friction, misalignment, vibration and overload.
- Protect them from dust. Provide suitable cover.
- Use oil only where required to fight friction; stray oil outside bearing is poison to electric motor. Check the condition of the gaskets to avoid leakage of oil.
- Prevent from friction.

- Check alignment.
- Check vibrations.
- Protect from overload and underload.

Can washer & bottle washer

- Lubricate the moving parts for smooth operation.
- Use soft water to minimize the scale formation.
- All the tanks should be completely emptied and brushed properly.
- Brush the jets and nozzles of the water periodically.
- Descale the equipment with a suitable acid solution every year.
- Paint the machine cover, hoods etc periodically.

Refrigeration system

- Manually purge the non-condensable gases and air which usually gather at the top of the condenser.
- Drain oil traps and also purge oil from evaporators and condenser.
- Defrost evaporator coils as often as necessary because heat transfer is reduced when covered with ice.
- Check regularly and change compressor oil and if necessary flush out sludge.
- Replace stuffing box packings and shaft if scoured.
- Check the condition of valves, valve seats, piston rings and bearings of the compressor, as well as shut off valves annually and replace if required.
- Keep line insulation in good repair.
- Check all gauges and thermometers regularly, at least once a day.
- Lubrication of all fans, motors, bearings and pumps periodically.
- Brine concentration should be tested regularly.

Steam raising units (Boilers)

- Water should be tested for softness before starting as well as during the operation after every four hours. Regenerate

water softner when necessary.

- Roto cleaner in the furnace oil line should be cleaned by turning 2-3 times before starting and at intervals of four hours.
- Remove burner rod, open and clean the nozzle with turpentine, kerosene oil or compressed air as and when required. Never clean with a metal wire or cotton waste.
- Burner nozzle and burner plate should be cleaned once a week.
- Clean the photo-resistor and the glass or housing from both sides. Observe that it detects flame with full intensity.
- Clean all fuel line strainers and filters on the boiler as well as on the main line.
- Check the working of feed water pre-heater tank and the proper functioning of float valve.
- Check different electric cut off/on switches, pressure gauges and safety devices.

Cream separators

- Check the gasket of the bowl.
- Check the working of rpm meter.
- Check the oil level. The oil should be changed at regular intervals and should never be allowed to contaminate with water.
- After day's operation dry all the bowl parts properly and keep them on a dry place to protect from rusting.
- Don't run the bowl when it is dry (or when it does not have milk/water).
- Start feeding the milk only when bowl has attained optimum speed and the flow of milk is steady.
- Temperature of the milk should be properly adjusted for maximum efficiency.

Homogenizers

- Check oil pressure and the level daily on the startup.
- Check all the gaskets and leak points particularly of water and oil.
- When working, cool the pistons with water.
- Homogenizer valves should be in perfect fitting with seating of suction and discharge valves.
- The valves should be kept well ground.
- Calibrate pressure gauges periodically with a standard instrumental device.

HTST pasteurizer

- Check the gaskets for leaks.

- Check the operation of pneumatic and electrical controls. Be sure that the air pressure is 25 psi.
- Check the operation of thermograph; replace graph and fill the ink.
- Check the quality of milk before feeding into the pasteurizer to avoid coagulation.
- Clean or replace the main filters.
- Check the operation of FDV periodically to see whether it goes into forward flow and diverted flow at temperature required for pasteurization.
- Descale the pasteurizer plates timely.

Bottle filler

- Check the leak of bottle filler valves. If leaky, grind with fine valve grinding compounds.
- Sterilize the rubber parts properly that come in contact with milk.
- Check and synchronize the cutting and capping of aluminium foils.
- Check vacuum system for leaks.
- Check the function of float valve in filler bowl.
- Check the supply of the compressed air to the capping machine.

Prepac machine

- The rods which operate the filling valves and film drive wheel axle bearings should be lubricated.
- Grease the slide shafts of the horizontal seal jaws.
- Check the oil level in the compressed air line lubricator from time to time, replace when necessary.
- Clean filter and water trap reservoir.
- Tighten the screws periodically as they get loosened by vibrations.

Batch sterilizer

- Periodic greasing of gear box is a must.
- All the sterilizer bearings should be oiled periodically.
- Check the leakage of all the steam lines and at the junction of the dial and the main body of the sterilizer.
- Check the choking at condensate outlet.

Butter churn

- Driving gear should be filled with lubricating oil upto proper level which can be seen in the oil gauge glass. Every second year the driving gear should be emptied of oil, carefully cleaned and filled with new oil.
- Churn should be started exactly in the

prescribed manner.

- Never change the speed while the churn is running.
- The clutch disc must be free from oil.

Vacuum pan

- Check the air leaks which may develop around valves, fittings, joints, covers and observation posts.
- All gaskets must be changed periodically.
- Avoid using high pressure steam.
- Economy of cooling water to the water condenser should be checked. Keep the difference of 5°F in the temperature between condenser discharge water and cooling water for better economy.
- Ensure heating surfaces are clean and free from deposits. Descaling of the plant at least once a year with a suitable acid solution is essential.
- Check water vacuum system.
- Periodical detection of steam oil leakage by hydraulic pressure test.
- In case of sudden power break down, immediately release the vacuum.

Falling film evaporators

- Air leaks, which may cause fluctuation in the temperature in the evaporator, should be checked. Leakages may occur around the valves, fittings, joints, coverings and observation points.
- High pressure steam should be avoided, because with higher temperature of condensation, the product may be defective.
- Economy of cooling water to the water condensing should be checked. No more water should be used than required to remove condensed vapour.
- All pipes and fittings should be tightened periodically.
- Check the working of vacuum pump monthly.
- To avoid choking of calandria tubes follow a regular cleaning cycle after each day's operation.
- In the event of electricity failure, the steam valves and cooling water supply must be shut off at once.

Spray drier (Anhydro)

- V-belts should be kept properly tight on the pulleys.
- Remove the soot in the burner every one-and-a-half months.
- Oil level in the gear box should be controlled and change oil periodically.
- Change the lubricating oil in the atomizer bearings daily.

- The atomizer is a very delicate and most important part and it must be handled carefully. Keep on wooden rack when cleaning, never keep it on the floor.
- Never run the atomizer on cold water or very concentrated milk; the spray nozzles may get clogged.

Roller drier

- Check the alignment of rollers.
- Adjust the knife pressure against the drum during each operation.
- Clearance between the rollers should be uniform.
- Condensate is to be removed constantly.
- Check oil level in the oil cup.
- All leakages should be checked.
- Flow of milk in the holes of the distribution tubes must be constant.
- Check the steam pressure indicator periodically.
- All the moving parts should be well lubricated.
- The drums should receive a film of oil or paraffin wax when not used regularly.
- Ensure that the knives are properly ground and adjusted on the rollers.
- End plates or end drums, which are spring loaded and contain the product above double drums, must be properly adjusted to prevent leakage and accumulation of solids.
- Roller surface must be kept smooth. Re-surfacing of rollers must be done after every 100 hours of run. It may be accomplished with emery cloth or by attaching a sanding bar to the scraper knife.

Ghee kettle

- Check all the joints including jacket for any leakage.
 - Steam release valve should be periodically checked for adjustments to give a required working steam pressure in jacket.
 - Proper inspection and cleaning of steam traps at least after every six months.
 - Check the accuracy of pressure gauges periodically.
 - Oil all the moving hinges at least once in a month.
-

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HASSIA has been building vertical sachet form/fill/seal machines for well over 30 years, and it is recognized as one of the leading innovators in the packaging world. Our sachet machines not only pack a multitude of products – such as toothpaste, soup and sauce powders, sugar, pharmaceuticals – but freshen-up towelettes as well. The economical advantages of HASSIA technology can be totally realized when 40 mm wide sachets are run in a 12-lane arrangement, producing more than 800 packs per minute! This single statistic convincingly confirms production cost effectiveness. All common, commercially available, heat-seal-lacquer coated foils and laminates can be used.

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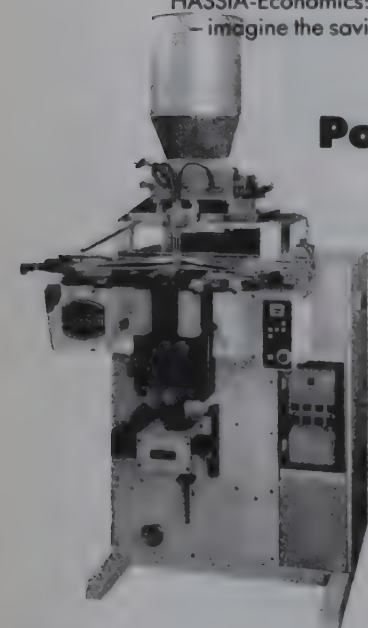
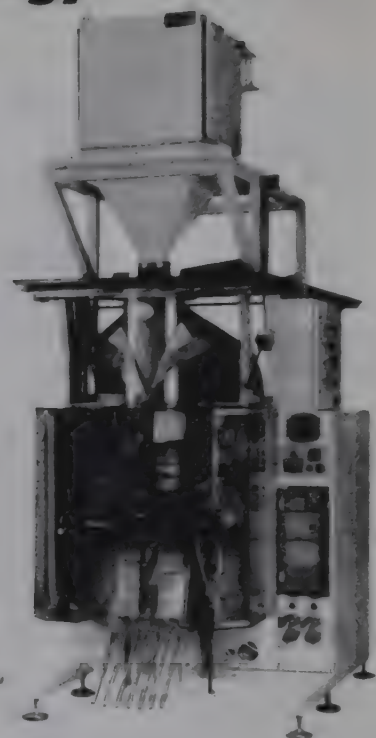
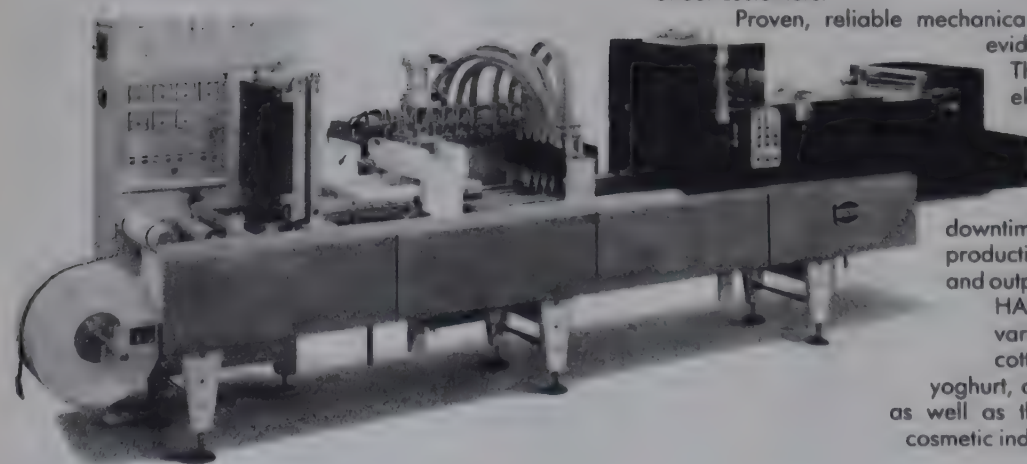
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Code of Hygienic Practices for Dairy Plants

Location: The selected site should be free from flooding, smoke, dust and other environmental pollutants, with availability of ample supply of potable water and adequate facilities for the treatment or disposal of effluents.

Building: A sturdy construction, capable of being easily cleaned, well ventilated to prevent excessive heat, steam, condensation and accumulation of odours and fumes with a provision for self-closing or double-action doors and air screens to prevent entry of rodents, flies, pests, etc. Well-lighted (50-foot candle intensity) by natural or artificial lighting, separate partitioned rooms for process sections and other departments such as store rooms, intermediate products room, workshop and machinery room, boiler room and finished products warehouse. Provision of quality control laboratory to monitor dairy products during manufacture and distribution. Floors, walls, ceilings and fixtures of the products handling area should be vermin-proof, non-toxic, non-absorbent, impervious to water and other liquids and easy to clean and disinfect.

Services and utilities: Water in adequate supply, cold and hot potable soft and free from bacteria, chemicals and other contaminants. Use municipal water, where possible. Steam in adequate supply for cleaning, disinfection, processing and other operations. Steam for direct contact with milk should be filtered and fitted with non-return valves to prevent the sucking back of products into the steam line. Refrigeration for sufficient cooling capacity for processing and cold storage. Cleaning and disinfection facilities for equipment and utensils and hand-washing, with provision for soap and detergents. The changing room with convenient toilet must be fitted with self-closing door facilities for changing, storing and drying of clothes. And first-aid facilities such as dressings and common medicines for minor injuries and ailments.

Equipment: Designed and constructed to permit thorough cleaning, disinfection and visual examination and free drainage; accessible to manual cleaning. Should have provision for obtaining product samples periodically for quality assessment. All milk contact surfaces should be non-toxic and unreactive, smooth and free from pits and crevices and withstand repeated exposure to normal cleaning and sterilization stresses and other processes. Provision for cleaning in-place, periodical manual cleaning of accessories, plants and multi-use containers. Equipment for heat processing be provided with accurate instrumentation, controls, flow diversion valves, pumps cut-outs or alarms. Compressed air drawn from clean source and filtered. Facilities for cooling milk on receipt and after heat treatment to 4°C and for maintaining it at that temp.

Material Handling: Milk obtained from healthy animals under hygienic conditions of good bacteriological quality and free from antibiotics, chemical residues, extraneous matter, objectionable taints and odours, chilled to 4°C to prevent bacterial growth and development of toxins. Other edible raw materials and ingredients free from objectionable odours, taints and extraneous matter stored under conditions that will prevent contamination, infestation, absorption of moisture and spoilage. Non-edible materials be stored separately from edible products; pesticides and insecticides must carry a warning label and kept under lock and key.

Cleaning and disinfection of plant and equipment: All food contact surface should be efficiently cleaned daily after use to remove the milk deposits and sanitized shortly before use. Equipments used for fat in continuous phase are cleaned and disinfected as required, at least once a week. Spray driers and powder handling systems in continuous use are cleaned at weekly interval, using brushed or vacuum equipment. Wet cleaning should be carried out thoroughly and all parts dried before reuse by passing hot air at 160°C for about 10 minutes. Atomisers of spray driers dismantled, cleaned and dried

at least once in each production run, or not less than once every 24 hours. Cleaning-in-place is done by circulating suitable solutions in equipment which is not practical to dismantle and clean manually. Effective cleaning is essential for successful disinfection of equipment and plant. Any equipment not used within six hours of disinfection should be re-disinfected before use.

Quality control: Constant chemical and microbiological examination of raw materials, intermediate products and final products be conducted. A regular microbiological surveillance of cleaning and disinfection equipment and detergent strength is a must for manufacturing products with improved quality.

Packaging: Packages should be nontoxic and non-reactive and preserve the quality of the products. Be stored in a dry place away from manufacturing areas. Packaging be carried out under aseptic conditions.

Storage and transport of finished products: Products should be stored at appropriate temperature and in a clean environment. Transport in clean vehicles exclusively meant for dairy products. The internal surface of the vehicle should be smooth, impervious and easy to clean and disinfect. Short shelf life products should be transported in refrigerated or insulated vehicles at temperatures between 0°C to 6°C.

Hygiene of the personnel: Persons engaged in handling dairy products should be healthy and free from infectious diseases, cuts and sores. Employees should be trained in maintaining high degree of personal cleanliness. Smoking, eating and spitting in the process area should be prohibited. Conduct health check at periodic intervals. Clean protective clothing (head cover, hand gloves and footwear) should be worn. Visitors should observe hygienic requirements. They should not be taken to the milk processing areas but allowed to view the processing operations through balcony or windows. Cats, dogs and other pet animals should be excluded from the premises.

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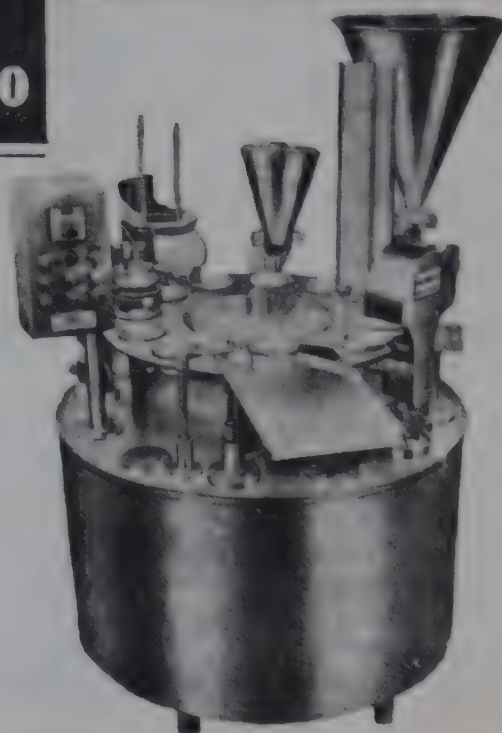


TABLE 61. Bacteriological standards for sterility of dairy equipment.

Equipment	Standards for satisfactory sterility		Frequency of checking
	Max standard plate count/ litre of capacity (Rinse method)	Max standard plate count/ 900 sq cm of surface (Swab method)	
Milk can/pail	1,000	—	One in every batch of 50
Milk bottle	1,000	—	Four bottles just before the addition of fresh lot of detergent
Milk receiving tank/ vats	—	5,000	Once every day immediately after the preparation of equipment for operation.
Weighing bowl/pan	—	5,000	- do -
Storage/holding transport tanks	—	5,000	- do -
Batch pasteurizer	—	5,000	- do -
Plate heat exchanger	—	5,000	- do -
Surface cooler	—	5,000	- do -
Cotton filter cloth	—	5,000	Once every week.
Evaporator	—	5,000	Every time the equipment is cleaned for operation.
Roller drier	—	5,000	- do -
Bottle filler	(Circulation method SPC of first litre of rinse coming out (25,000)	—	Coliform count not more than 10 per litre.
HTST plate pasteurizer	- do -	—	- do -
Homogenizer	25,000	—	Every time the equipment is cleaned for operation. Coliform — max 10/litre
Cream separator/ clarifier	25,000	—	- do -
Spray drier	25,000	—	- do -
Ice cream freezer	25,000	—	- do -
Walls, floors, etc	—	—	Free from visible dirt and mould growth
Milk crates	—	—	- do -

Source: Dairy Handbook (Processing), NDRI, Karnal, 1980, pp 156-7.

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Indian Milk Products: A Compendium

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A significant portion of the milk produced in India has been traditionally converted into a variety of heat and/or acid coagulated, heat desiccated and fermented intermediaries and products. These practices seem to have originated from sheer necessities arising out of climatic factors, regional/seasonal surpluses, difficulties in transportation/marketing, coupled with the perishable nature of milk. These processes have essentially remained unchanged and confined to the unorganized sector over the millenium. Further, these processes continue to be labour intensive and energy-wise inefficient. Due to the

small scale and scattered production, standardization of the traditional products in terms of sensory profiles, compositional and physico-chemical attributes has been an elusive goal to pursue. Considerable need exists for restructuring this sector of the industry for attaining product standardization and quality assurance within the scope of regional influences. An endeavour has been made here to consolidate available information on the status of current technology, product characteristics and future development possibilities for traditional milk products from different regions of India.

Products Obtained by Heat and/or Acid Coagulation

CHANNA

Obtained by the 'heat-acid' coagulation of cow milk. Base material for a variety of sweets. Soft, spongy body, granular texture.

Origin: Eastern states.

Existing Technology: Cow milk is heated to boiling point and held for about 10 minutes. When temperature drops to 70°C, sour whey from the previous day's batch or dilute citric acid solution is gradually added with constant but slow stirring till coagulation is complete. Coagulum is allowed to settle, and whey is drained off. The coagulum is collected in a cloth bag, and free whey allowed to drain off. Traditionally, chhana is packed under whey.

Physical Attributes: Creamish white in appearance, compact but spongy body, sweetish acidic flavour.

Approximate composition: Moisture: 50-55%; Fat: 22-26%; Protein: 15-20%; Lactose: 2.0-2.5%; Ash: 1.8-2.2%.

Shelf life: About 3 days at 25°C and 12 days under refrigeration.

Use: Base material for Rasagolla, Chumchum etc.

Newer Technologies: Attempts have been made to mechanize the process of coagulation and drainage of whey. Dried Chhana has been prepared by the spray-drying process. A slurry of chhana containing about 20% solids is finely ground, employing micro-pulveriser, followed by spray drying to attain a moisture content of 3.5%. The product when packaged under nitrogen, displays a shelf life of about 2-4 months at the ambient temperatures.

Future Development Possibilities: Mechanized processes for continuous cheese curd production and drainage of whey could be potentially employed for chhana manufacture. Attempts are being made to utilize concentrated milks for chhana manufacture. Immediate need exists for development of suitable packaging systems and which are essential for organized marketing and quality assurance.

PANEER

Heat-acid coagulated product from buffalo milk. Marble white, compact body, closely knit texture. Base for sweets and culinary dishes/snacks.

Origin: Known to the nomads of South-West Asia. Introduced to the North-Western regions probably by the Persian/Afghan invaders who settled down in the Karakoram mountain region of Himalayas.

Existing Technology: Standardised buffalo milk (5.5% fat) is heated to 95-100°C in a vat. Coagulation is carried out at 80-85°C with 1 or 2% citric acid solution with slow but constant stirring (pH 5.6 to 5.8). As the coagulum settles down, whey is drained off. Coagulated mass is collected and lightly pressed (1.0-1.5 kg/cm²) under cloth for about 30 minutes. It is cut into $\frac{1}{2}$ or 1 kg size pieces and floated in chilled water for forming of texture. Surface treatment with 0.5% H₂O₂ and 0.1% pimarison (anti-fungal agent) enhances the shelf life of the packaged product.

Physical Attributes: Marble white in appearance, somewhat spongy body, close knit texture, sweetish-acidic nutty flavour.

Approximate Composition: Moisture: 52-58%; Fat: 23-27%; Protein: 22-26%; Lactose: 2.1-2.4%; Ash: 2.0-2.2%.

Shelf Life: About 2 weeks under refrigeration.

Use: Culinary dishes, filling in snack foods, milk sweets.

Newer Technologies: Utilization of reconstituted/concentrated milk for paneer making.

Fried paneer and frozen paneer for extended shelf life.

Future Development Possibilities: Adaptation of continuous Tofu manufacturing and packaging systems for the industrial production of paneer. Application of continuous frying equipment for the production of fried paneer.

Heat Desiccated Products

KHOA

Heat desiccated product, forms base for many popular sweets, plastics mass, compact body. Pale yellow to light caramel colour.

Origin: Well known almost all over India.

Existing Technology: Typically, buffalo milk in 4-6 litre lots is taken per batch and desiccated with vigorous stirring in shallow pans over direct fire. In about 5-10 minutes, a semi solid mass is formed that begins to leave the surface on stirring. Three types of khoa have been identified:

--Danedar: It has granular texture having 20-25% fat and 35-40% moisture. It is mainly used for the preparation of kalakand, granular burfi, etc.

--Dhap: This grade of khoa is typified by its fine grain structure. It contains about 20-23% fat and 37-44% moisture.

--Pindi: This form of khoa has a lower moisture content of about 19%; Fat: 37%; Protein: 18%; Lactose: 22%; and, Ash: 3.6%.

Shelf Life: Depending upon the post-manufacturing conditions of handling, khoa could be

kept upto 3-5 days at ambient temperatures and about $3\frac{1}{2}$ months under refrigerated conditions.

Use: Khoa forms the basic ingredient for a large number of sweets: burfi, peda, gulab-jaman, pantooa, kalakand, etc. It is also used for stuffing vegetables in culinary dishes.

Newer Technologies: Attempts have been made to mechanize the process of manufacture of khoa. Preconcentrated milk (30-35% TS) has been utilized for the manufacture of good quality khoa. Feasibility of manufacturing dehydrated from khoa, containing 3.5% moisture by employing a roller drier has been investigated.

Future Development Possibilities: Application of scrape surface heat exchangers hold a considerable promise for the continuous production of khoa in a fully mechanized system. Scope exists for the direct manufacture of finished khoa based products in a single pass of milk through a system integrating heat exchanger and packaging devices. Greater operational efficiency and high product turnover could be attained through such a futuristic approach.

KHURCHAN

Heat desiccated/clotted milk sweet.

Origin: North and Central regions.

Existing Technology: Buffalo milk is simmered in a shallow vessel, and only controlled occasional stirring is done to permit formation of thick skin on the surface of milk. The skin is scooped off occasionally and placed on the sides of the vessel to permit gradual evaporation and formation of a clotted mass. Sugar is finally added to sweeten the product for direct consumption.

Physical appearance: Creamish-caramel colour, clotted, semi-solid body, with creamy consistency, sweetened caramelised flavour.

Approximate Composition: Moisture: 28%; Fat: 23%; Protein: 15%; Lactose: 15%; Sugar: 15%; and, Ash: 3%.

Shelf Life: About 5-7 days at refrigerated temperatures.

Use: Much relished dessert.

RABRI

Heat desiccated, thickened milk sweet, pale yellow to light caramel colour/flavour.

Origin: North and Central regions.

Existing Technology: Traditionally, buffalo milk is simmered in a shallow vessel with frequent scraping of the bottom. As some clots begin to appear, sugar is added and stirring continued, till desirable plastic consistency is attained.

Physical Appearance: White to creamish colour with caramelised clots, viscous body, creamy consistency, sweet caramel flavour.

Approximate Composition: Moisture: 35%; Fat: 20%; Protein: 13%; Lactose: 16%; Sugar: 15%; and, Ash: 3.5%.

Shelf Life: About 5-7 days at refrigerated temperatures.

Use: Popular dessert.

Future Development Possibilities: Application of scrape surface heat exchanger for direct conversion of milk into rabri in a single pass and integration of packaging system.

Fermented Products

CHAKKA

Intermediate product obtained by draining of dahi for the preparation of shrikhand. Comparable to 'quarg'.

Origin: Western regions of India.

Existing Technology: Traditionally, chakka is prepared by draining the whey from lactic fermented dahi obtained from buffalo milk.

Physical Appearance: Marble white, closely knit plastic mass, acidic diacetyl aroma.

Approximate Composition: Moisture: 60%; Fat: 22%; Protein: 10%; Lactose: 4.4%.

Use: Shrikhand making.

Newer Technologies: A fully mechanized process has been developed by the National Dairy Development Board (NDDB) and installed at the Sugam Dairy, Baroda. Buffalo milk is fermented into dahi using lactic cultures. Dahi is stirred up, and passed through a quarg separator for continuous removal of whey and recovery of chakka.

DAHI

Fermented milk from lactic acid bacteria, comparable to yogurt.

Origin: All the regions of India.

Existing Technology: Milk is standardised, and pasteurised/boiled. Lactic culture is inoculated at 22-25°C, and incubation carried out at the same temperature for 8 to 10 hours till acidity of about 0.8% is developed.

Physical Appearance: White to creamish yellow, well formed curd can be sliced, and has creamy consistency, rich diacetyl aroma, mildly acidic flavour. Highly acidic form is preferred in some regions. Composition conforms to the milk employed for and setting, with consistent reduction of lactose due to lactic fermentation.

Use: Direct consumption. For preparation of lassi, kadhi, chakka and makkhan.

Newer Technologies: Use of well defined lactic cultures such as Streptococcus cremoris, S. lactis, IF-40 etc. Setting of curd in the final package to permit retention of desirable body and texture.

Further Development Possibilities: Continuous methods using newly evolved culturing and fermentation techniques.

LASSI

Stirred dahi with added water and sugar/salt comparable to butter-milk.

Origin: Northern and Western regions.

Existing Technology: Dahi is stirred up with sugar (6-8%) and water (10-20%). It is desirable to homogenize the product for improved body and texture.

Physical Appearance: Whitish, viscous fluid, with creamy mouthfeel, sweetish, rich aroma of diacetyl and mildly to highly acidic.

Use: Refreshing beverage.

Newer Technology: Stirred curd technique during fermentation process.

MATTHA (Butter Milk)

Fluid left over after churning of dahi for makkhan preparation.

Origin: Common to all regions of India.

Existing Technology: In the traditional method of makkhan/ghee preparation, the fluid left over after churning of dahi is known as matha. It is highly flavourful and mildly to highly acidic. Essentially a rural domestic product.

Composition: Contains about 0.5% fat and 6-7% milk solids.

Use: Refreshing beverage.

SHRIKHAND

A speciality prepared from chakka. Plastic body, smooth texture.

Origin: Western regions of India.

Existing Technology: Traditionally, sugar, saffron, cardamom, dry fruits/nuts are added to chakka, and kneaded to smooth consistency.

Shelf Life: About 15 days at refrigerated temperatures.

Use: Dessert, popular dish, and used for preparation of shrikhand wadi.

Newer Technologies: In a fully mechanized process developed by the National Dairy Development Board (NDDB), planetary mixer is employed for mixing/kneading of chakka and other ingredients. A fully continuous/mechanized system has been evolved for forming, filling and sealing the polyesterene containers of the product.

Future Development Possibilities: Thermised shrikhand is being developed that would permit a shelf life of about 7 to 15 days at ambient temperatures. Shrikhand has also been prepared in the spray direct form at the National Dairy Research Institute (NDRI).

SHRIKHAND WADI

Origin: Western regions of India.

Existing Technology: Shrikhand is heat desiccated to a plastic mass in a shallow vessel.

Composition: Approximately, Moisture: 6.5%; Fat: 7.4%; Protein: 7.7%; Lactose: 15.9%; Ash: 0.8%; and, Sugar: 62.9%.

Use: Direct consumption.

Frozen Milk Products**KULFI**

Frozen dessert from concentrated milk. Icy texture due to lack of air incorporation.

Origin: Northern, western, central and eastern regions of India.

Existing Technology: Milk is concentrated in a shallow pan. Nuts, flavour and sugar are added. The mix is then traditionally filled in conical metal moulds. The product is frozen in a mixture of ice and salt.

Approximate Composition: Fat: 7-8%; SNF: 17-18%; Sugar: 13-15%.

Physical Appearance: White to slightly creamish, icy body and texture, (there is no overrun comparable to ice cream), nutty, caramelised flavour.

Use: Dessert.

MALAI-KA-BARAF

Origin: Northern and western regions of India.

Existing Technology: Malai and heat-desiccated concentrated milk form the base material to which sugar, nuts and flavour are added. The mixture is placed in a metal cylindrical container, and frozen in ice-salt mixture.

Use: Dessert.

Fat Rich Milk Products**GHEE**

Heat clarified milk fat, with rich aroma, comparable to butter oil.

Origin: Known since Vedic period, it is a well established product all over India.

Existing Technology: Several methods for the manufacture of ghee are in vogue. Traditionally, ghee is prepared by the milk-dahi-makkhan-ghee method. In the organized sector, the milk-cream-ghee or milk-cream-butter-ghee, or milk-cream-butter-pre-stratification-ghee method is employed. The final stage of ghee preparation involves heat desiccation in steam jacketed vessel. Ghee residue is an important by-product that could be utilized in a variety of ways for filling of snack foods, and for making of sweets/candy.

Physical Appearance: Typically ghee represents a mixture of liquid fat and granular crystalline fat. It has a pleasant aroma which is the main characteristic of ghee.

Composition: Fat: 99% to 99.5%; Moisture: 0.5%.

Shelf Life: 6 to 12 months at ambient temperatures.

Use: Cooking medium, flavouring of food as a topping, used as a tonic/therapeutic medium in the traditional form of medicine.

Newer Technologies: Adaptation of cream concentrators for enriching fat content of creams, which reduces the energy requirements for evaporation of moisture. A number of scrape surface heat exchanger designs has been developed that permit fully mechanized/continuous operation. A patented process of this type has been developed. Further work on mechanization is under progress at the National Dairy Research Institute, Karnal.

Future Development Possibilities: A fully automated, continuous method of ghee production is being contemplated. Thermodynamically efficient designs are being developed. Monitoring device for controlling moisture content by employing electronic instruments need to be developed for such systems.

MAKKHAN

Obtained by churning of dahi. Comparable to ripened cream butter.

Origin: Known since Vedic times, it is used all over India.

Present Technology: Traditionally, cold water is mixed with dahi, and churning carried out by specially designed wooden devices. Grains of makkhan appear on the top of fluid butter milk, which are scooped out and patted into a smooth compact mass. Operations are confined to the rural domestic spheres and form part of unorganised marketing.

Physical Appearance: Buffalo milk yields, white makkhan, while cow milk yields yellowish product. The body is compact, similar to creamery butter, but the product has typical diacetyl flavour, which originates from dani during fermentation process.

Approximate Composition: Moisture: 10-20%; Fat: 78-80%; SNF: 1-1.5%.

Shelf Life: 3 to 10 days under refrigerated temperature.

Use: Ghee manufacture, direct consumption (as butter) and cooking medium.

Milk Sweets and Delicacies

BURFI

A khoa based sweet -- white to light cream colour, firm body, smooth to granular texture.

Origin: Known all over India.

Present Technology: Prepared by using techniques that are suitable for small-scale operations. Khoa and sugar (25-35%) are mixed in a shallow pan with concomittant heating and stirring. Forms of burfi containing shredded coconut, nuts, chocolate and special toppings are well known.

Future Development Possibilities: Direct conversion of standardised milk and other ingredients into burfi in a fully mechanized system integrated with suitable packaging devices.

CHUMCHUM

Sweet prepared from chhana, small round balls, coated with sugar/khoa, firm body and close knit texture.

Origin: Eastern regions of India.

Present Technology: Chhana is kneaded into balls and boiled in sugar syrup. Cooking is continued until desirable body and texture are formed. The surface may be coated with khoa powder.

CHHANA-KHEER

A milk delicacy, concentrated milk with interspersed pieces of chhana.

Origin: Eastern regions of India (Paneer-kheer in Northern regions).

Present Technology: Milk is simmered on low heat, till reduced to about half the original volume. Sugar is added and simmering continued. Chhana is kneaded and cut into cubes, which are added at this stage. Heat is turned off when milk/sugar have penetrated into cubes.

CHHANA-MURKI

Sweet prepared from chhana base. Small cubes, coated with sugar, firm body, close knit texture.

Origin: Eastern and northern regions of India.

Present Technology: Chhana/paneer is kneaded and cut into cubes. Cubes are cooked in boiling sugar syrup till firm. Cooked cubes are then removed from syrup and upon cooling sprinkled with flavour, nuts and colour.

GULABJAMAN

Khoa based sweet. Round or cylindrical in shape, dark brown exterior, soaked in thick sugar syrup, firm body, smooth texture.

Origin: Northern, western and central regions of India.

Present Technology: Khoa and maida/suji are mixed in about 3:1 ratio, with about 1% baking

powder. The mixture is kneaded with water to form a dough. Ball or cylindrical shapes are prepared and fried in cooking medium till golden brown or alternatively dark brown colour develops. Fried balls are then soaked in sugar syrup (33%).

Newer Technologies: Khoa could be replaced with roller dried/spray dried milk powder. A fully mechanized/continuous process has been developed by the National Dairy Development Board (now under operation at Sugam Dairy, Baroda) for producing 8 tonnes of gulabjaman/day. It consists of dough forming, ball forming, glazing, frying, and sugar syrup dosing devices (directly into the package) integrated into a continuously operating system.

KALAKAND

Khoa based sweet, light caramel colour, granular texture, firm body.

Origin: Northern regions of India.

Present Technology: Similar to burfi, but some citric acid is added to khoa during the heating process to permit formation of well defined grains. The granular khoa is mixed with ground sugar in desired proportion and kneaded at room temperatures. Flavours are added according to taste.

KHEER

Rice cooked in milk, sweetened, thick consistency.

Origin: Northern, western and central regions of India.

Present Technology: Milk is simmered on medium heat. Coarse rice, that has been soaked in water previously, is added @ 6%. Sugar is added @ 6-8%. The mixture is simmered till rice softens up and shows signs of gelatinization, leading to the substantial thickening of the product. Chopped nuts and cardamom may be added optionally. Future Development Possibilities: Pressurized, steam jacketed kettle could be employed for the manufacturing process and integrated with packaging system for commercial production of kheer in the organized sector.

MILK CAKE

Almost similar to kalakand, but a part of the mass is caramelised more intensely, and then layered between the less caramelised portion of the product.

PALPAYASAM

Similar to kheer, but with fried rice and sugar, borneol and saffron.

Origin: Southern regions of India.

Present Technology: Similar to kheer, but sugar/jaggery, borneol and saffron are usually added. Rice is fried in ghee until slightly brownish. It is then cooked in three times the amount of water. Milk is added when sufficiently cooked and simmering/stirring continued till rice softens up without losing its shape. Sugar and flavour are added and product allowed to cool.

PEDA

Khoa based sweet, ball shaped, compact body, smooth texture.

Origin: Northern, western and central regions of India as well as some parts of South India.

Present Technology: Khoa is mixed with sugar, cardamom, nuts etc, and heating done in a shallow pan with constant stirring till sufficiently caramelised (depending upon regional preferences). This is patted into a compact mass, in the shape of balls with flattened top and bottom ends.

PANTOOA

Similar to gulabjaman, but with chhana added.

Origin: Eastern regions of India.

Existing Technology: Similar to gulabjaman, except that dough is made with both khoa and chhana, along with other ingredients.

RASAGOLLA

Chhana based speciality, round balls cooked/served in sugar syrup, typical spongy body, smooth texture.

Origin: Eastern States of India.

Existing Technology: Typically, chhana, maida, suji, and baking powder are mixed to form a dough. Balls are made of desired sizes and cooked in boiling sugar syrup, during which spongy texture builds up. The cooked balls are soaked in sugar syrup. Flavour is added when product has cooled.

Composition: Fat: 5%; Sucrose: 45%; Protein: 5%; Moisture: 55%.

SANDESH

Chhana based sweet, somewhat firm body, smooth texture.

Origin: Eastern regions of India.

Existing Technology: Kneaded chhana and sugar are mixed and cooked on low heat in a shallow vessel. The processed mass is placed into moulds to give desirable form/shape. Colour and flavour may be added optionally.

TABLE 62. Average composition of cow and buffalo milk in India.

Average percentage by weight

Constituent	Breed of Cow				<u>Buffaloes</u>
	Sindhi	Gir	Tharparkar	Sahiwal	
Water	86.07	86.44	86.58	86.42	83.63
Fat	4.90	4.73	4.55	4.55	6.56
Protein	3.42	3.32	3.36	3.33	3.88
Lactose (Carbohydrate)	4.91	4.85	4.83	5.04	5.23
Ash (Minerals)	0.70	0.66	0.68	0.66	0.70
Solids-not-fat (SNF)	9.03	8.83	8.87	9.03	9.81
Total solids (TS)	13.93	13.56	13.42	13.58	16.37

Source: Annual Report, 1948, of the Indian Dairy Research Institute (now known as the National Dairy Research Institute).

NEW PRODUCTS & PROCESSES

Aseptic Packaging

The marketing of pasteurized milk has some inherent difficulties owing to several techno-economic factors such as lack of refrigeration systems, refrigerated transport, refrigerated space in super markets or other milk outlets and of refrigerators in homes. In view of these considerations, the UHT (Ultra High Temperature) process for marketing fluid milk was initiated under Operation Flood. This is now emerging as an attractive commercial alternative. Five Aseptic Packaging stations have already been commissioned in Surat, Indore, Jaipur, Guntur and Baroda. Packing material equivalent to 530 lakh half-litre milk packs and 255 lakh 200 ml fruit drinks and flavoured milk packs was supplied to the Aseptic Packaging Stations during the year 1986-87, by the Hindustan Packaging Company Ltd, a subsidiary of Indian Dairy Corporation. The experience gained so far has indicated strong possibilities of UHT milk emerging as one of the alternatives to marketing milk under the prevailing conditions.

LP System

Under the conditions prevalent in India, application of mechanical refrigeration for preservation of raw milk has presented numerous problems. High cost of refrigeration machinery, coupled with erratic supply of electricity, frequent breakdown of equip-

ment and difficulties in timely repairs under rural condition lead to spoilage of milk resulting in economic losses. Systematic studies have been carried out in India signifying excellent potential of Lactoperoxidase (LP)-system for preservation of raw milk.

Activation of LP-system involves addition of about 25 to 70 ppm thiocyanate and 15 to 30 ppm hydrogen peroxide (food grade) in equimolar concentrations, preferably three hours after milking. The naturally-occurring enzyme lactoperoxidase present in raw milk oxidizes thiocyanate to strongly bacteriostatic/bacteriostic, though short-lived products. Milk could be preserved for 11 to 22 hrs depending upon season of the year and hygiene of milk production/handling under field conditions.

Detailed studies have demonstrated that there is no effect of the LP-system on the physico-chemical or nutritional characteristics of milk. The oxidative stability of lipids in products prepared from milk preserved by the LP-system is not impaired. However, manufacture of fermented milks and cheese from milk preserved by the LP-system requires use of resistant cultures, otherwise delayed acid production occurs.

The Central Committee for Food Standards (CCFS) is considering amendment to the existing PFA rules (Part X, Preservative Rule 53) to in-

clude thiocyanate (upto 75 ppm) and hydrogen peroxide (upto 50 ppm) as Class II preservatives. At the instance of the CCFS, the safety aspects, using primates as test subject, are being investigated by the Indian Council of Medical Research. The technical aspects of milk preservation have been investigated at the National Dairy Research Institute. On the basis of available evidence in India and abroad, the LP-system could be cleared by the CCFS to enable conservation of previous milk nutrients by the organized dairy industry in India.

-- Dr B N Mathur, Senior Scientist, Dairy Technology Div, NDRI, Karnal.

Bactofugation

It is the process of removing the bacteria from milk by high speed centrifugation. Bactofugation of cold milk or milk preheated to 43 to 45°C eliminates about 67 to 85 per cent of the bacteria present, whereas double treatment removes about 95 per cent. The best results are obtained when bactofugation is combined with pasteurization (99 per cent reduction of bacterial load). Under Indian conditions, bactofugation can effectively be used as a pre-treatment before UHT processing to reduce the initial spore count and thus achieve maximum sterilization efficiency in UHT processed milk.

-- Dr S K Gupta, Head, Dairy Technology Div, NDRI, Karnal.

Urea-Molasses Lick

In a country like India where pressure on land is increasing, where man and animal vie with each other for food and succour, any step towards easing the situation is welcome. Indian dairying as an industry took a giant leap forward in the 'seventies and brought in its wake new problems. To keep milk prices well within the reach of the common man, it is necessary to keep the feed cost as low as possible. Due to the scarce availability of green fodder and high cost of concentrates, the feeding cost remained high. A solution to this situation is to increase the efficiency and utilisation of crop residues which form the basic feed and utilise the concentrates as a limited supplement to support the high production in improved milch animals. Therefore research, especially in the field of animal nutrition, has been directed towards finding a practical solution.

Since crop residues contain more structural carbohydrates than stored carbohydrates, it is seldom found to be palatable to cattle/buffaloes. Moreover, the lignin bond structure of crop residues makes it indigestible. The ruminant system is designed to forage immense quantities of natural fibre and then to convert it into assimilable nutrients necessary for its various physiological functions. Therefore, a highly efficient rumen fermentation can increase the intake and digestibility of crop residues to a greater extent.

Rumen fermentation can be increased by stimulating the microbial activity in the rumen by way of supplying

the required nutrients to the microflora uninterruptedly. Various methods were tried in the past; such as urea molasses liquid feed, urea molasses spray on straw, etc. However, under field conditions, they created problems. Therefore, a technology based on the biological control of urea intake by the animals' own system seemed to be the only feasible solution. It led to the development of urea molasses block lick popularly known as 'animal chocolate' is the produce developed at the National Dairy Development Board, Anand. It is the admixture of molasses, urea, minerals and natural proteins in the form of a hard solid block, and is manufactured in a specially designed plant, attached to cattle feed plants.

The product has been extensively tested under farm and field conditions. The feeding trials conducted in growing stock, lactating animals, including Jersey, Jersey Crossbred and Surti buffaloes, have shown that the product will help to supplement feed to cattle and bring down the cost of their feeding. The main features of urea molasses block lick are:

- Increased rumen fermentation;
- Increased microbial protein yield;
- Supply of essential minerals;
- Easy to handle and transport;
- Free from toxicity;
- Lowered feeding cost for production; and
- Commercially feasible for production.

The product has been successfully marketed in the

villages of Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Orissa and West Bengal. The remarkable benefits of urea molasses block feeding are:

- Increase in the intake of crop residues;
- Decrease in the requirement of concentrate for milk production;
- Increase in growth rate in a straw-based ration.
- Normal health and reproduction.
- Early maturity and production.

The most vital impact of urea molasses block lick feeding is its spectacular effect on reducing the feed cost for milk production. Indications are that a rural milk producer could save around Rs.2.50 per animal per day in feed costs without affecting the health of the animal or the level of production. Thus, the low-producing Indian animals would no longer need to depend on scarce green fodder/concentrate feeding to prove their genetic potential. This reduces the pressure on the available concentrates and green fodder and thus permits a differential feeding system for higher producing animals.

In the Operation Flood areas, the NDDB has already established three plants for the manufacture of urea molasses block lick. Eleven more plants are in the stage of planning.

The feeding of animal lick could begin once the animal starts eating grass/straw regularly. However, it is not advantageous to feed animal lick to suckling calves.

Bactoscan

Counting the actual number of bacteria in the raw milk is a test that indicates the standard of hygiene or cleanliness as a tool for improving the quality of milk products.

Many dairying countries have recognised the importance of a precise measure for the hygienic conditions of milk production, and quality schemes for payment based on bacteria content have been established.

The bacteriological quality of the milk can be determined by the use of Bactoscan — an instrument for the fast direct counting of bacteria in raw milk. The applied technique is called continuous flow fluorescence microscopy, in which the bacteria are stained with acridine orange and counted directly. All sample preparation is performed automatically, and human errors are thus eliminated. Results are available in 7 minutes, compared with 48-72 hours required for the plate count.

Milko Scan

Milko Scan is a microprocessor controlled high speed infra-red analyser for multi-component analysis of milk. It gives a read-out of the fat, protein, lactose, solids/SNF at a speed of 360 to as high as 600 samples per hour. It is ideally suited for large modern milk testing laboratories which demand analysis equipment that is rapid, accurate and reliable, for purposes of payment and quality control.

Raksha FMD Vaccine

RAKSHA FMD Vaccine is manufactured by Indian Immunologicals, Hyderabad (a Unit

of Indian Dairy Corporation, managed by National Dairy Development Board). The vaccine incorporates indigenous strains of the serotypes 0, A22, C and Asia-I of FMD virus isolated from the disease outbreaks and carefully selected for broad immunogenic spectrum. Incorporation of A22 strain in the quadrivalent vaccine itself eliminates the need for follow-up vaccination with a monovalent A22 vaccine.

The vaccine is manufactured in the largest and most modern production unit in Asia, using the BHK deep suspension cell culture technology, the know-how for which was provided by the Wellcome Foundation Ltd., UK. The virus is inactivated with an aziridine compound to ensure that no residual infectious virus is present in the vaccine which is probable in the case of formalin inactivated vaccine. The application of modern techniques of actual virus mass determination and concentration of antigen resulted in the vaccine dose being only 3 ml (instead of the usual 10 ml dose) which ensures ease of injection and lesser discomfort to the animal. The vaccine is rigorously tested for potency by actual cattle challenge test in FMD free animals to ensure that it provides adequate protection in regularly vaccinated livestock.

Indian Immunologicals have produced around 12 million quadrivalent doses of FMD vaccine during the year 1986-87.

Milk Fizz: A New Drink

Dairy farmers in the United States and most of Europe are often swamped by oceans of unsold lactic products. But a novel idea may soon come to their rescue: carbonated milk

That, at least, is the hope of Illinois-based Dairy Research Inc, the promotional arm of the United Dairy Industry Association. Its laboratories have developed a process to inject carbon dioxide into skim milk. The method differs slightly from the one used to fizz up water for traditional sodas, but the Chicago researchers won't reveal any of their secrets until they obtain a patent. They do say that the sparkling drink could appear in groceries around the globe late next year. Meiji, one of Japan's largest dairy processors, has already expressed an interest in marketing it, as have companies in the United States, Canada and four European countries. There has also been talk about an alcoholic version of the new beverage.

Nutritional value: Consumers with a weakness for the fun of bubbles would also get all of milk's nutritional values: the calcium, protein and vitamins are not lost in the carbonation process. What carbonation does eliminate is the sticky white upper-lip mustache and the unpleasant film that coats the tongue. The natural taste of milk—disliked by many child and adult—is all but covered up by the bubbles. Researchers are now experimenting with flavours rang-

TUNE INTO TOMORROW

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ing from chocolate to cola. Initial tasters elected coconut and root beer (which is reminiscent of "a flat without the ice cream," as a spokeswoman for the association put it) as their favourites. Peppermint flavouring, however, had little success.

Because consumers as a rule do not plan their purchases of soft drinks as carefully as they do those of dairy products, the beverage's shelf life, which at present barely exceeds five days, will need to be extended. Ultra High Temperature processing, a method that enjoys considerable popularity in Europe, may help achieve that. The dairy industry would probably go to considerable lengths to overcome such obstacles.

On the average, each American gulped down more than 43 gallons of flavoured, carbonated soft drinks last year, and dairy producers are thirsting for a share of that market. -- Pascal Privat in Newsweek, October 27, 1986.

Fodder Production Unit

With the increasing pressure on available land, the output of green fodder is on the decline. One recent technological innovation to help overcome this situation is the environmentally-controlled fodder production unit (FPU). It provides optimum plant growth conditions, utilizing soilless technique. The FPU can produce one tonne of clean, fresh green fodder

every day of the year, regardless of weather conditions. The unit is a hermetically-sealed and environmentally-controlled chamber, fitted with trays in which fodder is grown. From seed to feed takes only eight days. From then on, there is a continuous cycle in which 84 trays are harvested and replanted everyday. The daily output of fodder can be stepped up proportionately by increasing the number of FPUs, using the modular principle.

The innovation of environmentally-controlled fodder production unit will give an added thrust to the milk-enhancement programmes in the country by meeting the shortage of green fodder for livestock.

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President

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Managing Director

CONVERSIONS

Average weight of different types of milk and creamsAverage weight of one litre of:

Whole Milk						
(a) Cow milk - (3.5% fat)	. . .	. . .	. . .	. . .	. . .	1,030 gm
(b) Buffalo milk - (6% fat)	. . .	. . .	. . .	. . .	. . .	1,028 gm
Full Cream milk - (6% fat)	. . .	. . .	. . .	. . .	. . .	1,028 gm
Standardized milk - (4.5% fat)	. . .	. . .	. . .	. . .	. . .	1,029 gm
Toned milk - (3.0% fat)	. . .	. . .	. . .	. . .	. . .	1,032 gm
Skim milk - (0.01% fat)	. . .	. . .	. . .	. . .	. . .	1,036 gm
Cream with 20% fat	. . .	. . .	. . .	. . .	. . .	1,013 gm
Cream with 30% fat	. . .	. . .	. . .	. . .	. . .	1,002 gm
Cream with 40% fat	. . .	. . .	. . .	. . .	. . .	993 gm

Yields of selected dairy products from milk100 kg whole milk:Yields:

with 4.0% fat	. . .	. . .	approx 4.75 kg butter
with 4.0% fat	. . .	. . .	approx 13.00 kg whole milk powder
with 3.5% fat	. . .	. . .	approx 9.45 kg cheddar cheese with 37% moisture

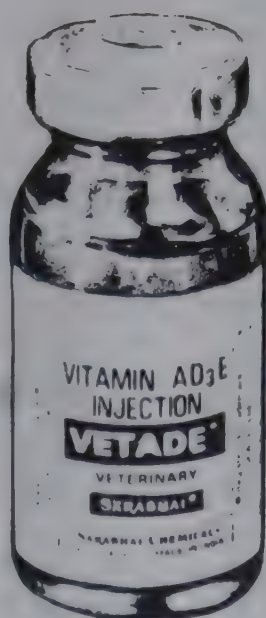
100 kg skim milk with 9.5% solids:Yields:

. . .	. . .	approx 9.8 kg skim milk powder
. . .	. . .	approx 16.1 kg cottage cheese
. . .	. . .	approx 7.5 kg wet casein
. . .	. . .	approx 3.5 kg dried casein

Requirement of milk to make 1 kg of selected dairy productsTo make one kg of:Requires:

Burfi	. . .	3.00 litres of milk with 6.0% fat
Butter	. . .	13.00 litres of milk with 6% fat
Cheese (Cheddar ripened)	. . .	10.00 litres of milk with 3% fat
Chhana	. . .	8.00 litres of milk with 3% fat
Condensed milk	. . .	2.44 litres of milk with 3.7% fat, 9% SNF
Cream (40% fat)	. . .	11.11 litres of milk with 6% fat
Curd	. . .	1.00 litre of milk
Evaporated milk	. . .	2.00 litres of milk with 4.5% fat, 9% SNF
Ghee	. . .	18.00 litres of milk with 6% fat
Gulab Jamuns	. . .	1.00 litre of milk with 6% fat
Ice-cream mix	. . .	1.60 litres of milk with 6% fat
Khoa	. . .	5.00 litres of milk with 6% fat
Khurchan	. . .	8.00 litres of milk with 6% fat, 9% SNF
Mishti Doi	. . .	1.20 litres of milk with 5% fat
Peda	. . .	3.00 litres of milk with 6% fat
Paneer	. . .	5.00 litres of milk with 5% fat
Rabri	. . .	8.00 litres of milk with 6% fat, 9% SNF
Rasagolla	. . .	1.50 litres of milk with 3% fat
Shrikhand	. . .	2.20 litres of milk with 2.4% fat
Skim milk muska	. . .	5.00 litres of milk (Skim milk)
Skim milk powder	. . .	10.50 litres of milk (Skim milk)
Whole milk powder	. . .	7.50 litres of milk with 4% fat

SYNONYM
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VITAMINS
FOR
VETERINARY
USE



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Section 3

MANPOWER DEVELOPMENT

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SYNONYM
OF VITALITY,
VIGOUR,
VITAMINS
FOR
VETERINARY
USE



VETA

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Power Development



Dr M. ARAVINDAN

Sr Scientist,

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&

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Indian Council of Agricultural Research

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The oldest institution in this field is the Indian Veterinary Research Institute (IVRI), established in 1889, followed by the setting up of the National Dairy Research Institute (NDRI) in 1923 and the National Dairy Development Board (NDDB) in 1965. Recently, a Central Institute for Research on Buffaloes (CIRB) has been created at Hisar in Haryana in 1985. In addition, a Bureau of Animal Genetic Resources is located in Karnal.

The animal science education in India had its beginning in 1862 when a veterinary school was opened at Poona, followed by a veterinary college at Lahore, now in Pakistan, in 1882. A civil veterinary department was established in 1891, and with its expansion, more veterinary colleges came into being.

The first landmark in the history of dairy education was the establishment of the Imperial Institute of Animal Husbandry

TABLE 63. Facilities for dairy science education. (For details, see main listing).

Institution	Diploma	Graduate	Post-Graduate
<u>ANDHRA PRADESH</u>			
College of Vet Science, APAU, Hyderabad	-	-	MVSc(DP/DT)
College of Vet Science, APAU, Tirupati	-	-	MVSc(DP/DT)
Dairy Science College, APAU, Tirupati	-	BSc(DT)	MVSc(DP/DT)
Institute of Dairy Technology, Kamareddy	-	BSc(DT)	-
<u>BIHAR</u>			
Sanjay Gandhi Institute of Dairy Technology, Rajendra Agril Univ, Patna	-	BSc(DT)	-
<u>GUJARAT</u>			
Institute of Rural Management, Anand	PRM	-	-
Sheth M C College of Dairy Sc, GAU, Anand	-	BSc(DT)	MSc(DT) & PhD(DT)
<u>HARYANA</u>			
Dairy Science College, NDRI, Karnal	PG Dip (ART)	BSc(D/DT)	MSc(D) & PhD
<u>KARNATAKA</u>			
Dairy Science College, UAS, Bangalore	-	BSc(DT)	MSc(DS), PhD
NDRI, SRS, Bangalore	PG Dip(QC&DEnt)	-	MSc(D) & PhD
<u>KERALA</u>			
College of Vet & Anim Scs, KAU, Mannuthy	-	-	MVSc(DS), PhD
<u>MADHYA PRADESH</u>			
College of Dairy Technology, Raipur	-	BSc(DT)	-
<u>MAHARASHTRA</u>			
College of Agri, MAU, Parbhani	-	-	MSc(AH&D)
College of Vet & Anim Scs, MAU, Parbhani	-	-	MVSc(DS)
Dairy Science Institute, Bombay	IDD(DT)	-	-
Faculty of Agriculture, KKV, Dapoli	-	-	MSc(Ag in D)
Faculty of Agriculture, MPKV, Rahuri	-	-	MSc(DS)
Faculty of Agriculture, PKV, Akola	-	-	MSc(Ag in D)
<u>PUNJAB</u>			
Dept of Food Science, PAU, Ludhiana	Dip in DT	-	-
<u>RAJASTHAN</u>			
Dairy Sc College, Sukhadia Univ, Udaipur	-	BSc(DT)	MSc(DH/DS), PhD(DH/DS)
<u>TAMIL NADU</u>			
Madras Vet College, TNAU, Madras	-	-	MVSc(DS), PhD(DS)
<u>UTTAR PRADESH</u>			
Allahabad Agril Institute	IDD(DH/DT)	-	MSc(DT)
College of Agri, GBPUAT, Pantnagar	-	-	MSc(DH), MVSc(DH)
Govt Polytechnic, Etawah	Dip in DE	-	-
Institute of Agri, BHU, Varanasi	-	-	MSc(AH&D), MSc(DT)
R B S College, Bichpuri, Agra	-	-	MSc(Ag in AH&D)
Uday Pratap College, Varanasi	-	-	MSc(Ag in AH&D)
<u>WEST BENGAL</u>			
Dairy Science College, BCKVV, Mohanpur	-	BSc(DT)	MSc(DB/DC)
Indian Institute of Tech, Kharagpur	-	-	PhD(DE)
State Inst of Dairying, Haringhata	IDD(DH)	-	-

Abbreviations: Ag=Agriculture; AH=Animal Husbandry; ART=Analytical Research Techniques; D=Dairying; DB=Dairy Bacteriology; DC=Dairy Chemistry; DE=Dairy Engineering; DEnt=Dairy Enterprises; DH=Dairy Husbandry; DP=Dairy Production; DS=Dairy Science; DT=Dairy Technology; IDD=Indian Dairy Diploma; PG=Post-Graduate; PRM=Post-Graduate Programme in Rural Management; QC=Quality Control.

programmes. Other nine Dairy Science Colleges currently functioning are located at Anand, Bangalore (two), Mohanpur (West Bengal), Patna, Raipur, Kamareddy (Andhra Pradesh), Tirupati and Udaipur. In addition, five institutions, offer diploma in dairy technology/husbandry. The NDRI at Karnal and Bangalore offer postgraduate diplomas. Also, many agricultural colleges offer dairy science as part of vocational courses at BSc level under the University Grants Commission scheme (See Table No 63).

Professional Managerial Personnel: To meet the wide-ranging and urgent manpower requirements for the rapidly growing dairy industry, the National Dairy Development Board (NDDB) set up in 1979 the Institute of Rural Management (IRMA) at Anand for training in management and consultancy in rural development.

Earlier, in 1971, the NDDB established the Mansinh Institute of Training at Meh-sana in Gujarat for middle level manpower, needed for dairy production and processing. Encouraged by its success, the NDDB set up three other Regional Demonstration & Training Centres (RD&TCs) at Erode, Jalandhar and Siliguri to cover the southern, northern and eastern regions. These centres aim to develop the needed manpower for the milk producers cooperative societies/union/federations for the effective implementation of Operation Flood. The training programmes cover artificial insemination and veterinary first-aid, frozen semen handling, milk procurement and inputs programme, inservice training for extension workers, orientation programmes for managing primary milk producers cooperatives, farmers induction programme and technical training for dairy technicians and quality control workers. The NDDB also organizes manpower development programmes at all levels in all disciplines of dairying and allied fields — from farmers' induction to cooperative dairying.

Training in frozen semen technology is imparted at the Central Frozen Semen Production and Training Institute (GOI), at Hessarghatta near Bangalore.

The contribution of the Bharatiya Agro Industries Foundation (BAIF), a private sector institution to the extension, training and research in the field of dairying has been widely recognized in propagating scientific dairying. Established in 1967 at

Uruli-Kanchan in Pune district, it is committed to provide instruments of gainful self-employment to thousands of rural poor through conversion of low-productive rural liabilities into productive assets through its integrated rural development centres in five states in Maharashtra, Rajasthan, Gujarat, Karnataka and Uttar Pradesh.

Many voluntary organizations such as the Action for Food Production (AFPRO) in New Delhi organize short-term training courses in different aspects of dairying in various parts of the country. In addition, some 130 Intensive Cattle Development Projects (ICDPs) and over 500 Key Village Blocks under the State Departments of Animal Husbandry also help to disseminate scientific dairying among traditional farmers.

Rural Development: The Department of Rural Development of the Ministry of Agriculture (GOI) launched a nationwide Integrated Rural Development Programme (IRDP) in 1978-79, aimed to help the poorest of the poor to rise above the poverty line. Presently, the IRDP covers over 5,000 community development blocks in the country. Animal Husbandry and Dairying forms an important component of the IRDP packet. A number of programmes, launched earlier, like the Small Farmers and Marginal Farmers Development Agencies (SFDA & MFAL) and Drought Prone Area Programme (DPAP) has now been merged into the IPDP packet.

Manpower Availability: One prerequisite for achieving the targets set for livestock production and health is a suitably planned manpower development programme. The various categories of this manpower include veterinary graduates and postgraduates, stock assistants, dairy engineers and other technicians, farm organisers, marketing specialists, administrative and other supporting personnel.

According to the available estimates, the sanctioned strength in various programmes both in the Central and State sectors comprise 28,564 veterinary graduates, 3,053 veterinary postgraduates, 68,070 stock assistants and 3,392 laboratory technicians. Of this, the available manpower includes 24,279 veterinary graduates, 2,595 veterinary postgraduates, 57,860 stock assistants and 2,883 laboratory technicians indicating a significant percentage of vacancies. The percentage of manpower employed is presented in Table 64.

TABLE 64. Percentage of manpower absorption in livestock development.

Activity	Veterinary Graduate	Veterinary Postgraduate	Stock Assistant	Laboratory Technician
<u>Animal Health Cover</u>				
Veterinary Services	47.8	11.0	59.2	-
Disease Investigation	0.9	8.6	-	34.2
Vaccine Production	0.9	6.8	-	24.5
Disease Surveillance and Control	3.2	0.2	3.8	-
Pharmaceutical Products	0.3	0.3	-	-
Total:	53.1	27.4	63.0	58.7
<u>Livestock Production</u>				
Cattle, Buffalo and Dairy	9.0	2.0	19.2	-
Sheep Development	2.4	0.2	3.2	-
Poultry Development	5.6	0.8	4.3	-
Piggery Development	0.2	-	-	-
Other Livestock Development	0.1	-	-	-
Total:	17.2	3.0	26.7	-
<u>Administration/Extension and Credit</u>				
Rural Development	20.6	-	8.9	-
Animal Husbandry Administration	6.1	-	1.4	-
Insurance and Banking	2.1	-	-	-
Training	0.9	-	-	-
Total:	29.7	-	10.3	-
<u>Veterinary Education and Research</u>				
Veterinary Colleges and Research Institutes	-	69.6	-	41.3
Total:	-	69.6	-	41.3
Grand Total:	100 (24,279)	100 (2,595)	100 (57,860)	100 (2,883)

ICAR Research Projects

PROJECT DIRECTORATE ON CATTLE -- Coordinating Cell: Military Dairy Farm, Meerut Cantt 250001; Ph: 77041/330; Project Dir: Dr V K Taneja.

Objectives: (i) Genetic evolution of Holstein crosses utilising Military Dairy Farms which will also involve progeny testing of a large number of bulls; (ii) Genetic studies on important indigenous breeds of cattle -- initially Ongole and Haryana for their draft and draft & milk respectively and undertake improvement through selection; (iii) Studies on adaptation of crossbred cattle. In addition, it will coordinate research activities of two adhoc schemes on nutrition efficiency and nutritional requirements of crossbred cattle and development of systems of field recording of performance data and their utilization in progeny testing of bulls.

Centres -- Hisar (Germ Plasm Unit, Data Recording Unit and Adaptation Studies): Haryana Agril Univ, -125004; Chief Scientist: Dr S C Chopra; Izatnagar (Adaptation Studies): Indian Veterinary Research Inst, -243122; Sr Scientist: Dr L P Nautiyal; Jabalpur (Adaptation Studies): JNKVV, -482004; Lam (Guntur) (Germ Plasm Unit, Data Recording Unit, Adaptation Studies): APAU, -522034; Sr Scientist: Dr A Sreeramamurthy; Rahuri (Adaptation Studies): Mahatma Phule Krishi Vidyapeeth, -413722.

ALL INDIA COORDINATED RESEARCH PROJECT ON BUFFALO -- Coordinating Centre: Central Institute for Research on Buffaloes, Hisar 125001; Ph: 4513, Gram: Bubalinex, Tlx: 0345-204 CIRB IN; Proj Coordinator: Dr V D Mudgal. Centres -- Anand: Gujarat Agril Univ, PO Anand Agril Inst, -388110; Reproductive Biology Res Unit, Incharge: Dr V M Mehta; Dharwad: Univ of Agril Scs, -580005; Geneticist: Dr P Basavaiah; Ludhiana: Punjab Agril Univ, -141004; Geneticist: Dr M S Tiwana; Vallabhanagar: Agril Res Station, Sukhadia Univ, -313601; Anim Geneticist: Dr L S Jain.

ALL INDIA COORDINATED RESEARCH PROJECT ON GOATS (For Milk, Meat and Fibre) -- Coordinating Centre: Central Institute for Research on Goats, Makhdoom, PO Farah 281122, Dist Mathura, UP; Ph: 51 (Farah Ex), Gram: Vetex; Proj Coordinator: Dr R K Misra. Centres on Milk -- Bikaner: Coll of Vet & Anim Sc, Sukhadia Univ; Scientist Incharge: Dr K P Pant; Mannuthy: Coll of Vet & Anim Sc, Kerala Agril Univ, -680651; Scientist Incharge: Dr C A R Raja. Centres on Meat -- Avikanagar: Western Regl Res Centre of the Central Inst for Research on Goats, -304501, Rajasthan; Scientist Incharge: Dr Satya Pal; Mhow: Coll of Vet Sc & Animal Husbandry, JNKVV, -453446, MP; Scientist Incharge: Dr K S Johar; Ranchi: Birsa Agril Univ, Kanke, -834007; Scientist Incharge: Dr Ram Adhar Singh. Centres on Fibre -- Mukteswar: Northern Regl Centre of the Central Inst for Research on Goats, -263138, Dist Nainital; Scientist Incharge: Dr G L Koul; Rahuri: Mahatma Phule Krishi Vidyapeeth, -413772, Dist Ahmednagar; Scientist Incharge: Dr V K Patil.

ALL INDIA COORDINATED RESEARCH PROJECT FOR EPIDEMIOLOGICAL STUDIES ON FOOT AND MOUTH DISEASE -- Coordinating Centre: Indian Veterinary Research Institute, 431 Modular Bldg, Izatnagar 243122, UP; Proj Coordinator: Dr A K Mukhopadhyay. Central Laboratory: Indian Vet Res Inst, Mukteswar-Kumaon, Dist Nainital. Centres -- Bangalore: Inst of AH & Vet Biologicals, Hebbal, -560025; Calcutta: Amalgamated Scheme, Dte of Vet Services, 37 Belgachia Rd, -700037; Guwahati: Dept of Microbiology, Coll of Vet Sc, Assam Agril Univ, Khanapara, -781022; Hisar: Dept of Microbiology, Coll of Vet Sc, HAU; Hyderabad: Vet Biological Res Inst, Shantinagar, -500028; Mathura: Dept of Bacteriology & Virology, Coll of Vet Sc, CSA Univ of Agri; Pune: Disease Investigation Section, Dte of AH, Aundh, -411007; Ranipet: Inst of Vet Preventive Medicine,

Ranipet, N A Dist, Tamil Nadu. Voluntary Unit: Disease Diagnostic Laboratory, National Dairy Development Board, Anand 388001, Gujarat.

Breeding): P L Manchanda; Pantnagar: GBPUAT, -263143; Prof (Plant Breeding): Dr S N Mishra.

ALL INDIA COORDINATED PROJECT FOR RESEARCH ON FORAGE CROPS — Coordinating Centre: Indian Grassland & Fodder Research Institute, Pahuj Dam, Jhansi-Gwalior Rd, Jhansi 284003, UP; Ph: 908, Gram: Ghasanusandhan, Tlx: 326-241; Proj Coordinator: Dr C R Hazra. Centres — Anand: Forage Res Project, GAU, -388110; Res Scientist: Dr J R Patel; Bangalore: Subabul Project, Old Agril College, Hebbal, -560024; Agronomist: Dr K Mune-gowda; Bhubaneswar: OUAT, -751003; Prof & Head, Agronomy: Dr A Misra; Coimbatore: Dept of Forage Crops, Coll of Agri, TNAU, -541003; Assoc Prof: Dr (Mrs) Sukanya Subramanyan; Faizabad: N D Univ of Agri & Tech, Kumarganj, -224001; Forage Breeder: Dr C P Vaish; Hisar: Dept of Plant Breeding, HAU, -125004; Plant Breeder: Dr D S Jatasra; Hyderabad: Livestock Res Inst, APAU, Rajendranagar, -500003; Agronomist: Dr B Lingam; Jabalpur: JNKVV, -482004; Forage Breeder: Dr D B Bahal; Jorhat: AAU, -785013; Asst Prof (Agronomy): H D Singh; Kalyani: BCKVV, -741235, Dist Nadia; Forage Breeder: Dr M A Roquib; Ludhiana: Dept of Anim Sc, PAU, -141001; Sr Breeder (Forage): Dr B S Sidhu; Palampur: Dept of Plant Breeding, HPKVV, -176062; Forage Breeder: Dr D C Katoch; Rahuri: MPKV, -413722; Forage Breeder: Dr J S Desale; Ranchi: Ranchi Vet Coll, Kanke, -834007; Sr Forage Breeder: Dr A P Singh; Uruli-Kanchan: BAIF, -412202; Res Prog Coordinator: Dr L L Relwani; Vellayani: Coll of Agri, KAU, -695522; Prof of Agronomy: Dr G Raghavan Pillai. Participating Centres — Akola: CRS, Punjabrao Krishi Vidyapeeth, -444104; Asst Breeder: N S Handanwar; Dapoli: Dept of Plant Breeding & Genetics, Konkan Krishi Vidyapeeth, -415712; Jaipur: Agril Res Stn, Sukhadia Univ, PO Durgapura, Jaipur; Asst Breeder (Forage): Dr (Mrs) Amrita Das; Jodhpur: Central Arid Zone Res Inst, -342003; Scientist (Agrostology): Dr M S Yadav; Kanpur: C S Azad Univ of Agri & Tech, -208002; Assoc Prof (Plant Breeding): Dr I D Tyagi; New Delhi: IARI, Commings Lab, -110012; Scientist (Plant

ALL INDIA COORDINATED RESEARCH PROJECT ON AGRO-INDUSTRIAL BY-PRODUCTS UTILIZATION FOR EVOLVING ECONOMIC RATIONS FOR LIVE-STOCK AND POULTRY — Coordinating Centre: National Dairy Research Institute, Karnal 132001; Ph: 4293 Ext 43, Gram: Dairy-search, Tlx: 0396-204 NDRI IN; Proj Coordinator: Dr M L Punj. Centres — Anand: Dept of Anim Nutrition, Inst of Agri, GAU, -388110; Scientist: Dr P M Talapada; Bombay: Dept of Anim Nutrition, Bombay Vet Coll, Parel, -400012; Scientist: Dr P M Puntambekar; Guwahati: Dept of Anim Nutrition, Coll of Vet Sc, AAU; Scientist: Dr B K Konwar; Hisar: Dept of Anim Nutrition, Coll of Anim Sc, HAU, -125004; Scientist: Dr Vidya Sagar; Hyderabad: Dept of Feed & Fodder Tech, Coll of Vet Sc, APAU, Rajendranagar, -500030; Scientist: Dr N P Purushotham; Ludhiana: Dept of Anim Scs, PAU, -141004; Scientist: Dr P N Langar; Madras: Dept of Anim Nutrition, Coll of Vet Sc, TNAU, -600007; Scientist: Dr R Kadirvel; Pantnagar: Dept of Anim Sc, GB Pant Univ of Agri & Tech, -263145; Scientist: Dr I S Aggarwal; Ranchi: Dept of Anim Nutrition, Coll of Vet Sc, Birsa Agril Univ, Kanke, -834007; Scientist: Dr J P Srivastava; Shillong: ICAR Res Complex for NEH Region, Ceddar Lodge, -793003; Scientist: Dr A K Verma; Trichur: Dept of Anim Nutrition, Coll of Vet Sc, KAU, -680651; Scientist: Dr P Ramachandran; Uruli-Kanchan: BAIF, -412202, Dist Pune; Scientist: Dr A L Joshi.

NATIONAL RESEARCH CENTRE ON YAKS (ICAR), Nikamadang, Arunachal Pradesh.

NATIONAL RESEARCH CENTRE ON MITHUNS, Vill Purva, PO Pfutsero, Chakhesang, Nagaland.

A WINDOW TO INDIA'S DAIRY WORLD!

Know who's doing what and where. All about know-how and know-why. A handy update on market data: Who buy's what? Who sells what? Where? Trends in demand and supply.

Education, Extension & Research Institutions

Andaman & Nicobar

DEPARTMENTAL TRAINING INSTITUTE, Dte of AH & Vet Services, Dollygunj Post, Port Blair, South Andaman. Offers short-term training of 9 months duration.

Andhra Pradesh

ANDHRA PRADESH AGRICULTURAL UNIVERSITY, Rajendranagar, Hyderabad 500030; Ph: 48011, Gram: Agriversity; Estd: 1964; Vice-Chancellor: Dr A Appa Rao, Ph: 48035.

Agricultural Research Institute, Rajendranagar, Hyderabad 500030; Ph: 48011. Education: Faculty of Vet Sc, Dean: Dr C V Reddy, Ph: 48146, 59369 (resi). Extension: Dir: H N Byra Reddy, Ph: 48057. Research: Dir: Dr S Mahaboob Ali, Ph: 48078; Asst Dir (Vet Res): Dr G Narasimha Rao, Ph: 48161.

College of Veterinary Science, Rajendranagar, Hyderabad 500030; Ph: 48143; Estd: 1946; Dean: Dr C V Reddy; Principal: Dr G V Raghvan; Dept of Dairy Production & Dairy Sc, Prof & Head: Dr M Rama Rao; Dept of Feed and Fodder Tech, Head: Dr M Raj Reddy. Education: Offers undergraduate course in Dairy Sc, Commercial Dairy Production, Food Tech (Dairy Products); Course in Dairy Production, Milk and Milk Products in BSc (Home Sc); Vocational course in Dairying for 1st year and IIInd year Intermediate students; Course in Dairy Sc and Dairy Production at postgraduate level. Extension: Incharge, Dairy Specialist: Dr G V Krishna Reddy. Offers short-term courses in basic skills in dairy production and processing. Research: AICRP on Forage Crops.

College of Veterinary Science, Tirupati 517502; Ph: 2531; Principal: Dr B Venkateswara Rao; Prof & Head (Dairy Sc) & Offr Incharge (Dairy Tech): Dr K Narasiah Naidu; Assoc Prof (Dairy Sc): Dr G M Krishna Moorthy; Assoc Prof (Dairy Microbiology): Dr B T Jairam; Assoc Prof (Dairy Chemistry): Dr M Lakshminarayana; Assoc Prof (Dairy Tech): Dr B V Raghvendra Rao. Education: BVSc & AH, BSc (Dairy Tech), MVSc (Dairy Production), MVSc (Dairy Tech).

Dairy Science College, Tirupati 517502; Principal: Dr B V Rao. For details, see also College of Veterinary Science.

COLLEGE OF AGRICULTURE, Bapatla 522101, Guntur Dist.

DIRECTORATE OF ANIMAL HUSBANDRY, Govt of Andhra Pradesh -- Livestock Assts Trg Centres -- Kakinada, Karimnagar, Reddipalli, Visakhapatnam, Warangal.

INSTITUTE OF ANIMAL REPRODUCTION, Dte of AH, Govt of Andhra Pradesh, Mandapeta, East Godavari Dist.

JAWAHAR BHARATI, Kavali 524202, Nellore Dist; Ph: 48. Principal: Dr V Ramakrishna. Education: Dept of Dairy Sc; Lecturer: R Mallikarjuna Reddy; Offers vocational Dairy Sc course of three years duration at BSc level; Offers vocational certificate course of 6 months duration after 10+2.

NATIONAL INSTITUTE OF NUTRITION (Indian Council of Medical Research), Jamai-Osmania PO, Hyderabad 500007; Ph: 71083, Gram: Nutrition, Tlx: 0425-6322; Dir: Dr B S Narasinga Rao, Ph: 71325 (resi).

NATIONAL INSTITUTE OF RURAL DEVELOPMENT, Rajendranagar, Hyderabad 500030; Ph: 48001, Gram: Gravik, Tlx: 0425-510; Dir-Gen I/c: J M Lyngdoh. Objectives: Research in different aspects of rural development from social sciences perspective. Short-term training programmes offered to senior functionaries concerned with programme formulation and implementation at different levels from district level upwards. Training courses

See also LATE ADDITIONS at the end of the listing

are also open to bankers, voluntary organisations and university faculties in social sciences. Duration ranges from one week to three weeks.

OSMANIA UNIVERSITY, Hyderabad.

Institute of Dairy Technology, College of Arts & Sc, Kamareddy 503113, Dist Nizamabad. Education: Offers four-year BSc (Dairy Technology) course. Dept of Dairy Sc: Dr Raja Rathinam.

S K UNIVERSITY, Anantapur 515003; Lecturer, Rural Dev: G Sreedhar.

SRI Y S RAJA REDDY COLLEGE, Pulivendla 516390, Cuddapah Dist; Ph: 72; Principal: J C B Peters. Education: Offers vocational Dairy Sc course at BSc level of 3 years duration.

Arunachal Pradesh

SCHOOL OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, Dte of AH & Vet, Govt of Arunachal Pradesh, Pasighat 791102, East Siang Dist; Dep Dir: Dr B Bora.

Assam

ASSAM AGRICULTURAL UNIVERSITY, Jorhat 785013; Vice-Chancellor: Dr B C Bar-thakur.

College of Veterinary Science, Khanapara, Guwahati 781022; Ph: 87281, Gram: Vetcol, Estd: 1948; Dean, Faculty of Vet Sc: Vacant. Education: Depts of Anim Production & Management/Anim Nutrition/Pathology, Heads: Dr N N Bora/Dr A Saikia/Dr B Choudhury. Extension: Dept of Ext Education, Head: T N Borgohain. Services: Vaccination, disease diagnosis, management, marketing, loans etc.

INSTITUTE OF FARM MANAGEMENT, AH & Vet Dept, Assam, Rani 781132, Dist Kamrup; Estd: 1980. Dir: Dr Basana Ranjan Haldar.

Bihar

BIRSA AGRICULTURAL UNIVERSITY, Kanke, Ranchi 834006; Estd: 1981; Vice-Chancellor: Dr J C Kundra; Dean: Dr H R Mishra.

Ranchi College of Veterinary Science & Animal Husbandry, Kanke, Ranchi 834006; Estd: 1960; Dir of Research: Dr A A Khan; Ph: 7339.

KRISHI GRAM VIKAS KENDRA, PO Neori-Vikas 835217, Ranchi; Proj Mgr: Dr S P Ganpule; Trg Incharge: Dr R I Jayakaran. Offers stockman training course to unemployed village youths in AI and vet first aid; Duration: 6 months; Qualifications: High school certificate.

KRISHI VIGYAN KENDRA, Divyayan, Ramkrishna Mission Ashrama, Swami Vishuddhananda Rd, Morabadi 834008; Trg Organizer: S Tiwari.

RAJENDRA AGRICULTURAL UNIVERSITY, Pusa 848125, Samastipur; Vice-Chancellor: Dr G Trivedi.

Bihar Agricultural College & Agricultural Research Institute, PO Sabour 813210, Bhagalpur.

Bihar Veterinary College, Patna 800014; Dean: Dr R N Singh.

Sanjay Gandhi Institute of Dairy Technology, Pusa 848125, Dist Samastipur; Ph: 78, 247, Gram: Agriversity; Assoc Dean-cum-Dir: Dr R A Singh. Education: BSc (Dairy Tech). (See late additions).

XAVIER INSTITUTE OF SOCIAL SERVICE, Purulia Rd, PB No 7, Ranchi 834001; Ph: 22769, Gram: Axis; Dir: Fr M V D Bogaert, sj.

Delhi

ACTION FOR FOOD PRODUCTION (AFFRO), 25-1A Institutional Area, Pankha Rd, D-Block, Janakpuri, New Delhi 110058; Ph: 552017, 552018, Gram: Afro; Estd: 1966. Exec Dir: J B Singh, Ph: 553652; Sr Livestock Specialist: Dr R T Kulkarni. Training: Offers courses in dairying, provides consultancy and assists in formulating project proposals.

DIRECTORATE OF EXTENSION, Dept of Agri & Cooperation, Min of Agri, GOI, West Block No 8, R K Puram, New Delhi 110066; Jt Sec (Extn): K R Nair, Ph: 387804; Jt Commissioners (Extn): Dr C S S Rao, Ph: 382543 & N Perumal, Ph: 602649; Dir of Admn: R G Banerjee, Ph: 384180.

Extension Training Unit: Dir: Dr Amar Singh, Ph: 602694; Jt Dirs (Extn): K S Tripathi, Ph: 606048; R S Kushwaha, Ph: 604994; Sr Home Economist: Smt Kanta Kapoor, Ph: 604994.

Farm Information Unit: Dir (Farm Info):
Smt M Jaganathan, Ph: 603565; Jt Dirs
(FI): Miss Shukla Hazra, Ph: 600591 &
R S Madhukar, Ph: 600591; Dr Ganga Ram,
Ph: 584610 (CTO Pusa); Editor (Hindi):
Vidyapati Jha, Ph: 601329; Editor
(English): A N Rai, Ph: 601329; Distri-
bution Offr: R K Gauri, Ph: 584610;
Business Mgr: John Nag, Ph: 600591.

Field Extension Unit: Dir (FE): Dr S L
Ghoshal, Ph: 604839; Jt Dir (FE): Dr V
V Sadamate, Ph: 606048; Jt Dir: V S
Pangtey, Ph: 605277.

Livestock & Horticulture Unit: Horticul-
ture Offr: C K Warman, Ph: 677455.

Sales Off: Garage No 18-19, Krishi Bha-
wan, New Delhi 110001; Mailing Super-
visor: B D Chawla, Ph: 387316.

INDIAN AGRICULTURAL RESEARCH INSTITUTE,
Pusa, New Delhi 110012. Dairy Section,
Agronomy Div, Sr Scientist (Livestock
Production & Mgmt): Dr Gurcharan Singh,
Ph off: 582081 Ext 239, resi: 584266;
Agro-Energy Centre, Sr Scientist (Agro-
nomy): Dr H K Singh.

INDIAN AGRICULTURAL STATISTICS RESEARCH
INSTITUTE (IASRI), Library Avenue, New
Delhi 110012; Ph: 587121; Dir: Dr Prem
Narain, Ph: 581479; Head, Anim Scs: Dr
J P Jain, Ph: 583398. Conducts research
in agril statistics and offers postgrad-
uate training courses to agril scien-
tists and professional statisticians.

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
(ICAR), Krishi Bhavan, Dr Rajendra Pra-
sad Rd, New Delhi 110001; Ph: 388991;
Estd: 1929. Dir-Gen: Dr N S Randhawa,
Ph: 382629; Dep Dir-Gen (Anim Scs): Dr
R M Acharya, Ph: 382545; Asst Dir-Gen
(Anim Production & Breeding): Dr C L
Arora, Ph: 389526; Asst Dir-Gen (Anim
Health): Dr C Natarajan, Ph: 389040;
Asst Dir-Gen (Dairying & APT): Dr S C
Jain, Ph: 387515; Asst Dir-Gen (Anim
Sc Ed): Dr P B Mathur, Ph: 585536;
Asst Dir-Gen (PIU): Dr S C Adalakha,
Ph: 389388; Asst Dir-Gen (Econ Studies
& Mgmt): Dr C C Maji, Ph: 384369; OSD
(PI&M): Dr N C Ganguli, Ph: 384369; Sr
Scientist (Anim Nutrition & Physiology):
Dr Kiran Singh, Ph: 388991/471; Sr Scien-
tists (Anim Breeding): Dr S C Chopra, Dr
D P Gulati, Ph: 388991/577; Sr Scientist
(Anim Sc Ed): Dr M Aravindan, Ph: 588029;
Sr Scientist (Anim Health): Dr M N Mal-
hotra, Ph: 388991/527; Dir (P&I): Dr V S
Bhatt, Ph: 5719881; Chief Editor: S N

Tata, Ph: 5721004; Editor (Anim Scs):
R R Lokeshwar, Ph: 5721004; PRO: S K
Sharma, Ph: 389106; Chief Librarian:
S Moitra, Ph: 389570.

Agri Research Information Centre (ARIC),
c/o ICAR, Krishi Anusandhan Bhawan, Pusa,
New Delhi 110012; Info Systems Offr: P C
Bose, Ph: 5719881 (PP).

NUTRITION FOUNDATION OF INDIA, B-37 Gul-
mohar Park, New Delhi 110049; Chmn:
Dr C Gopalan, Ph: 669254.

Goa

DEPARTMENT OF ANIMAL HUSBANDRY & VET SER-
VICES, Panaji, Goa; Dir: Dr A S Wagle,
Ph: 5381. Training -- Stockmen Training
Centre, Ela, Old Goa; Principal: Dr S K
Usgaonkar; Offers short-term courses to
farmers, and one-year course to veteri-
nary assistants.

Gujarat

AMUL RESEARCH AND DEVELOPMENT ASSOCIATION
(ARDA), c/o Kaira District Cooperative
Milk Producers' Union Ltd, Anand 388001;
Ph: 3402, Gram: Amuldairy; Estd: 1965;
Chmn: Manubhai D Patel; Sec: V H Shah;
Scientists: Dr C V Patel, Dr D G Shah,
K N Vyas, Dr M R Subnis, Dr A R Sheth,
Dr M C S Nair, Dr N Gopakumar, Dr (Mrs)
Sarojini Nair.

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE
-- BAIF Regional Office, Go Samvardhana
Kendra, Makarpura, Baroda 390014; Res
Programme Coordinator: Dr B R Patil;
Ahmedabad: c/o New Shorrock Mills,
Mafatlal Industries Ltd, Asarwa Rd, PB
No 2030, -380016; Res Programme Organi-
zer: Dr D V Rangnekar, Ph off: 386940.

DIRECTORATE OF ANIMAL HUSBANDRY, Govt of
Gujarat, AH Training Centres, Cattle
Breeding Farms -- Bhuj, Dist Kutch;
Mandvi, Dist Surat; Morbi, Dist Rajkot;
Thara, Dist Banaskantha; Offers 10 days
training in animal husbandry to SF, MF,
LL, ST, SC and others.

GUJARAT AGRICULTURAL UNIVERSITY, Sardar
Krushinagar 385506, PO Dantiwada, Dist

Banaskantha; Estd:1972; Vice-Chancellor: R Parthasarathy.

College of Veterinary Science & Animal Husbandry, Anand Campus, Anand 388001; Ph: 3464, Gram: Gujvet; Estd: 1964; Dean: Dr M R Patel. Education: Dept of Livestock Production; Head: Dr A D Dave; Dairy Science offered as part of EVSc & AH; MVSc & PhD in Livestock Production, Animal Genetics & Breeding and Animal Nutrition. Extension: Incharge: P M Zala, Assoc Res Scientist; Services: Mobile vet service, cattle camps, correspondence course under lab to land programme. Training: Three-day course for farm women in dairy animal management. Research: AICRP on Endocrinology (buffalo project); AICRP on Use of Agricultural By-Products and Industrial Waste.

College of Veterinary Science & Animal Husbandry, Dantiwada Campus, Sardar Krushinagar 385506, Dist Banaskantha; Ph: 39, Gram: Krushi; Estd: 1981; Principal: Dr V M Jhala. Education: Dept of Livestock Production & Mgmt, Head: Dr N S Radadia.

Livestock Research Station, Dantiwada Campus, Sardar Krushinagar 385506; Ph: 28; Research Scientist Incharge: Dr V M Jhala. Extension: Vaccination, infertility and disease diagnosis camps, feed analysis, mobile extension unit (also attends emergency calls); all services free; only fuel charges for emergency calls. Under DRDA programme, high pedigree bulls are supplied and frozen semen centre maintained. Research: AICRP Project on Sheep, Camel Nutrition and Mixed Farming Scheme in progress.

Livestock Inspector Training Centre, Dantiwada Campus, Sardar Krushinagar 385506; Ph: 39; Cofr Incharge: Dr V M Jhala; 2-year course in dairying; selected candidates are offered stipend by private dairy cooperatives.

Sheth M C College of Dairy Science, Anand Campus, PO Anand Agricultural Institute 388110; Ph: 3431, Gram: Agri-search; Estd: 1961; Principal & Dean: Dr J M Dave. Education— Departments: Dairy Technology, Head: Dr K G Upadhyay; Dairy Engineering, Head: Dr C M Shah; Dairy Microbiology, Head: Dr J M Dave; Dairy Chemistry, Head: Dr R S Sharma; Mgmt Sc, Head: Dr R D Patel. BSc (DT), MSc (Dairying)

and MSc in Dairy Tech, Dairy Microbiology and Dairy Chemistry and PhD in Dairy Microbiology and Dairy Chemistry. INSTITUTE OF RURAL MANAGEMENT, Post Box No 60, Anand 388001; Ph: 3100, 3101, Gram: IRMA, Tlx: 0172-207; Estd: 1979; Dir: P S Appu, Ph off: 3117, resi: 3666. Education: Offers two-year postgraduate programme in Rural Management (PRM). Services: Conduct research on operational problems in order to help improve the management of rural enterprises and projects; Undertake basic research into the processes of rural management; and Provide consultancy services to rural enterprises and organizations in the cooperative and other sectors.

MANSINH INSTITUTE OF TRAINING, Radhanpur Rd, Mehsana 384002, Gujarat; Ph: 22130, Gram: Dairyboard; Principal: V K Aggarwal. Training: 1-year fresh dairy-cooperation-apprentices; 90-day for experienced dairy maintenance crew; 35-day course in AI.

NATIONAL DAIRY DEVELOPMENT BOARD (NDDB), Anand 388001; Ph: 3002 to 3012, Gram: Dairyboard, Tlx: 0172-207; Sec: Dr (Miss) Amrita Patel. Farmers Organization Inputs & Training (FIT) Div — Exec Dir: Dr M P G Kurup; Dir (MD): Dr S P Mittal. Applied Res & Dev Div — Dep Dir: Dr S S Chaudhry; Sr Proj Exec (Prod Dev Lab): Dr M N Vyas. Regional Demonstration & Training Centres: Erode, Jalandhar and Siliguri.

SABARMATI ASHRAM GAUSHALA (Managed by National Dairy Development Board), Bidaj Ashram, Post Lali 387120, Dist Kheda; Ph: Bareja 80, 14; Cofr Incharge: Dr N B Patel; Section Head (Training Centre): Dr H B Joshi. Ahmedabad Off: Ashram Rd, Ahmedabad 380027; Ph: 407088. Training: Frozen semen handling; Refresher course for field workers; Field asst training; Fodder production and cattle mgmt; Self-employed Women's Association; and Semen lab technicians' training.

TATA MARGINAL FARM MANAGEMENT INSTITUTE, Tata Baug, Lunsikui, Navsari 396445; Head: Dr S K Das. Objectives: Train educated young men from rural India on management aspects of small composite farms, which includes agriculture, dairy, poultry and fishery. Agricultural marketing, accounting, book-keeping, farm planning and budgeting, and other associated

subjects related to complete management of the farm. Duration: six months.

Haryana

CENTRAL INSTITUTE FOR RESEARCH ON BUFFALOES, Sirsa Rd, Hisar 125001; Ph: 4513, 4170, Gram: Bubalinex, Tlx: 0345-204 CIRB IN; Dir: Dr V D Mudgal, Ph: 4488 (resi). Div of Nutrition & Physiology, Head: Dr S S Sengar, Ph: 5147; Div of Buffalo Mgmt, Head: Dr Rohtas Singh, Ph: 4170; Div of Breeding & Statistics, Head: Dr A K Chakravarty, Ph: 5147; Div of Meat Technology, Head: Vacant; Div of Forage Production & Agronomy, Head: Dr Shyam Singh. Research: AICRP on Buffaloes.

EXTENSION EDUCATION INSTITUTE, GOI, Nilo-kheri 132117, Karnal Dist; Principal: C L Gupta, Ph: 27; Vice-Principal: G A Kaleem, Ph: 84; Lecturer, Animal Husbandry: Dr Rampal Singh.

HARYANA AGRICULTURAL UNIVERSITY, Hisar 125004; Ph: 3721, Gram: Agriversity; Estd: 1970; Vice-Chancellor: L D Kataria, Ph: 3721 Ext 240; Dean, Postgraduate Studies: Dr R P Kapil, Ph: 3721 Ext 219, 3789 (resi).

College of Animal Sciences, Hisar 125004; Ph: 3721 Ext 241. Estd: 1966; Dean: Dr P C Panda, Ph: 4079. Dept of Anim Breeding, Head: Dr J S Sharma, Ph: 3721 Ext 262; Dept of Livestock Production & Management, Head: Dr R A Singh, Ph: 3721 Ext 231; Dept of Anim Production Physiology, Head: Dr S P Singal, Ph: 3721 Ext 235; Dept of Anim Nutrition, Head: Dr Vidya Sagar, Ph: 3721 Ext 256; Dept of Anim Products Technology, Head: Dr C M Kapoor, Ph: 3816. Education: Offers courses for the BVSc & AH and postgraduate programme leading to MSc and PhD. Extension: Services: Technical advice on breeding, feeding, management, reproductive physiology and processing of animal products; Educating farmers on various aspects of animal production programmes; feed analysis and artificial insemination. Training: Short-term training for farmers, ex-service-men, field staff, marketeers and processors on various aspects of livestock production including processing, preservation and marketing of animal products,

artificial insemination and frozen semen technology. Research: Improvement of cattle, buffalo, sheep and goat through efficient breeding and management programmes. Investigations on different lactational mal-functions and its corrections in buffaloes; preservation studies on frozen semen; forage evaluation.

College of Veterinary Sciences, Hisar 125001; Ph: 3721/281, 4242, Gram: Vetcol; Dean: Dr V K Sharma; Dept of Anatomy & Histology, Head: Dr Yashwant Singh; Dept of Vet Physiology, Head: Dr O P Nangia; Dept of Vet Pharmacology, Head: Dr B D Garg; Dept of Vet Microbiology, Head: Dr N C Jain; Dept of Vet Pathology, Head: Dr J R Sadana; Dept of Vet Parasitology, Head: Dr D P Banerjee; Dept of Vet Medicine, Head: Dr R D Sharma; Dept of Vet Surgery & Radiology, Head: Dr D Krishnamurthy; Dept of Vet Clinics, Head: Dr I S Chandna; Dept of Vet Gynaecology & Obstetrics, Head: Dr S K Verma; Dept of Vet Public Health & Epidemiology, Head: Dr R C Kulshreshtha. Profs of Eminence: Dr O P Gautum, Dr N K Chandiramani, Dr N S Ruprah, Dr R P Singh, Dr S Prasad, Dr R K Kaushik, Dr R K Paul Gupta, Dr A R Rao. Offers courses in BVSc & AH, MVSc & PhD. Services: Feed analysis for aflatoxin, Disease diagnosis and post-mortem.

Directorate of Extension Education, Ph: 3721 Ext 285; Dir: Dr D S Bhatti; Ext Specialist (Anim Scs): Dr Kirpal Singh; Ext Specialist (Vet): Dr S R Bansal.

NATIONAL BUREAU OF ANIMAL GENETIC RESOURCES, NDRI Campus, Karnal 132001; Ph: 3918, 2840, Gram: Genetics, Tlx: 0396-204 NDRI; Estd: 1984; Dir: Dr Daya Singh Balaine, Ph: 2276 (resi); Sr Scientist: Dr R Sahai, Ph: 4363. Training: Computer Centre, Head: Dr M George, Ph: 4365. Offers training in computer based livestock data and information management; and computer usage in livestock data analysis.

NATIONAL DAIRY RESEARCH INSTITUTE (NDRI), Karnal 132001; Ph: 4293, Gram: Dairy-search, Tlx: 0396-204 NDRI; Estd: 1923; Dir: Dr R Nagarcenkar, Ph off: 4293, resi: 4291; Jt Dir: Dr R K Patel, Ph off: 2621, resi: 2163. NDRI, an apex centre for research and education in dairying in the country, developed from the then Imperial Institute of Animal Husbandry and Dairying founded in 1923 at Bangalore has now the main campus at Karnal which was shifted in 1965 and two regional

stations at Bangalore (1923) and Kalyani (1964). The Institute is under the administrative control of the Indian Council of Agricultural Research since 1966.

Regional Stations -- Southern Regional Station, Adugodi, Bangalore 560030; Ph: 579661, Tlx: NDRI/845-8397; Head: Dr S R Sampath, Ph off: 575119, resi: 565499; Eastern Regional Station, Kalyani Univ Campus, Kalyani 741235; Head: Dr S B Basu, Ph off: 264, resi: 777.

DIVISIONS

Dairy Bacteriology, Prof & Head: Dr D N Prasad, Ph: 2851
Dairy Chemistry, Prof & Head: Dr M K Jain, Ph: 2840
Animal Bio-Chemistry, Prof & Head: Dr S R Anand
Dairy Cattle Genetics, Prof & Head: Dr M Gurnani, Ph: 2096
Dairy Cattle Nutrition, Prof & Head: Dr D D Sharma, Ph: 2832
Dairy Cattle Physiology, Prof & Head: Dr M L Madan, Ph: 2867
Dairy Technology, Prof & Head: Dr S K Gupta, Ph: 2843
Dairy Engineering, Prof & Head: Dr S P Agrawala
Dairy Economics, Statistics & Mgmt, Prof & Head: Dr B S Rawat, Ph: 2849
Operational Research Projects, Principal Scientist: Dr R K Patel, Ph: 2621
Dairy Extension, Prof & Head: Dr R L Kherde, Ph: 2847
Krishi Vigyan Kendra & Trainers' Training Centre (KVK & TTC), Head & Chief Trg Organiser: Dr T S Sohal, Ph: 2128

ACHIEVEMENTS

Dairy Production: Development of Karan Swiss cattle averaging 3,500 litres of milk per lactation incorporating Brown Swiss and Sahiwal inheritance; Karan Fries cattle averaging 3,800 litres of milk per lactation incorporating mainly Hol. Friesian and Tharparkar inheritance. Progeny testing of crossbred bulls on multi-herd basis. Improvement of Murrah buffaloes by selection procedure; reduction in calf mortality and improving breed efficiency in cattle and buffaloes; animal behaviour studies; standardization of technology of freezing semen.

Development of complete feed for ruminants and milk substitute for calf and kid feeding; microbial protein synthesis;

efficiency of feed conversion to milk in different kinds of animals; use of non-protein nitrogen sources such as urea, ammonium sulphate and enrichment of agro-industrial by-products. Forage production through relay cropping/multiple cropping.

Economic evaluation of crossbred cattle; Cost of milk and Fodder-production; "Degcure" for degnala disease; Marketing of buffaloes in Haryana; Efficiency of work production of crossbred bullocks vs Haryana bullocks.

Dairy Processing: Equipment for continuous manufacture of ghee, lacto-peroxidase/thiocyanate/hydrogen peroxide system for preservation of raw milk; processes for the manufacture of infant food formula conforming to the compositional standard recommended by the WHO/FAO Codex Alimentarius standards; Formule for lactose intolerant and small per term/low birth weight infants; soybean based weaning food; Spray dried ice cream mix; Cheddar and Mozzarella cheeses from microbial rennet; Beverages from whey; Starters for cultured dairy products; Bacterial rennet, microbial phospholipids, iodophore, improved silage production; Sweetened condensed milk; Tea complete; Coffee complete; Extension of shelf life of paneer; Gulabjamun mix; Lactose hydrolyzed milk; Detection of adulterants in milk and milk products; Safety aspects of milk and milk products; Nutritional assessment of milk and milk products.

Dairy Management: Study and survey of various costs that enter into production and processing of milk and product manufacture under field, farm and factory conditions; dairy business management and extension of information; development of dairy farming system for different agro-climatic conditions, varying land holdings and levels of operations.

Dairy Science College, NDRI, Karnal 132001; Ph: 2621; Estd: 1957; Affiliated to Kurukshetra Univ; Jt Dir & Ex-Officio Principal: Dr R K Patel.

COURSES

BSc Dairying (DT): Four years Trimester: Eligibility: 10+2 or equivalent with English and min. 55% in PCM and Entrance Exam (EE) in June.

MSc Dairying: Two-three years. Trimester pattern in ten subjects with admission through EE; Subject and eligibility: **Bacteriology:** BSc (Dairying/DT/DH); BSc (Microbiology/Chemistry/Botany/Zoology) and BSc (Chemistry/Maths/Physics). **Dairy Chemistry:** BSc (Dairying/DT/DH); BSc (Physics/Chemistry/Maths). **Dairy Technology:** BSc (Dairying/DT); BSc (Food Technology). **Animal Genetics and Breeding:** BSc (Dairying/DH); BSc (Animal Science), BVSc, BSc (Agri). **Animal Nutrition:** BSc (Animal Science/DH), BVSc. **Animal Physiology:** BSc (Dairying/DH), BVSc, BSc (Animal Science). **Animal Biochemistry:** BSc (Dairying/DT/DH), BVSc; BSc (Hons) Biochemistry; BSc (Physics/Chemistry/Maths); BSc (Chemistry/Botany/Zoology). **Livestock Production & Mgmt:** BSc (Dairying/DH), BVSc, BSc (Animal Sc/Agri). **Extension:** BSc (Dairying/DT/DH/Home Sc/Agri), BVSc. **Dairy Economics:** BSc (Dairying/DT/DH/Agri), BVSc. All degrees except BSc Dairying/DT/DH require prerequisite courses.

PhD: By course work and research in 3-4 years offered in almost all the above subjects. Eligibility: Master's Degree in the same subject with 2nd Division; Admission October.

DIPLOMA COURSES

PG Diploma in Quality Control in Dairy Processing at Bangalore Campus, Eligibility: Degree in Dairying/Anim Sc/Vet Sc/Agri/Food Tech/Physics, Chemistry, Maths/Physics, Chemistry, Biology/Chemistry, Botany, Zoology with 50% marks. Through: Entrance examination in June. Duration one year.

PG Diploma in Analytical Research Techniques at Karnal Campus. Eligibility: Degree in Physics, Chemistry and Maths/Physics, Chemistry & Biology/Chemistry, Botany and Zoology with 50% marks. Duration one year.

PG Diploma in Management of Dairy Enterprises at SRS of NDRI, Bangalore. Eligibility: Bachelor's degree in Dairying/Animal Sc/Agri Animal Sc/Vet Sc/Mech Engg with 55% marks. Duration one year.

PROJECTS

Indo-Dutch Projects: Project Coordinators: Dr B N Gupta (Karnal) and Dr S R Sampath (Bangalore). Major research

activities: Development of a suitable, acceptable urea treatment and/or other simple chemical treatment for agricultural residues (mainly cereal straws) in order to improve the quality of these products as animal feed. Implementation of these methods to bring them to the farmer in the villages through their established channels. Development of new methods through research and pilot studies for the biological treatment (fungi) of straws/stovers/agricultural wastes/residues, to break lignin portion from cellulose and hemicellulose.

All India Coordinated Research Project on "Determination of the availability of animal feed resources and their utilization with special emphasis on crop-residues, by-products of industries, forest, aquatic and slaughter house in origin and animal organic waste for evolving economic rations of livestock and poultry". Coordinating Unit: NDRI, Karnal. Project Coordinator: Dr M L Punj (Animal Nutrition).

DIVISIONS

Dairy Bacteriology: Prof & Head: Dr D N Prasad (Spl: Ultrastructure of dairy organisms); Ph: 2851. Scientists: Dr D K Mathur (Microbial Enzymes), Dr S Neelakanthan (Soil & Silage Microbiology), Dr R N Sinha (Anaerobic Microbiology), Research Projects: 10 including, freeze dried starter cultures, preparation of fermented milk products, flavour production by starter cultures, morphology of lactic culture organisms, preparation of fermented whey beverages, microbiology of indigenous milk products, public health, quality control, butter preservation studies.

Dairy Chemistry: Prof & Head: Dr M K Jain (Spl: Lipids/Flavour Chemistry); Ph: 2840. Scientists: Dr V K Joshi, D Datta Roy & Dr M P Mathur (Milk Protein), Dr U P Sharma (Lipid Chemistry), Dr O P Singhal (Milk Lipids/Quality Control), Research Projects: 20 including Studies on milk proteins, milk lipids, physico-chemical properties of milk and milk products, whey proteins, trace minerals in milk, oxidative rancidity in ghee, detection of additives in indigenous milk products, keeping quality of milk and milk products and flavours of indi-

genous milk products, effect of frying medium on properties of gulabjamun, immobilized milk clotting enzymes, enzymatic hydrolysis of lactose.

Animal Bio-Chemistry: Prof & Head: Dr S R Anand (Semen Bio-Chemistry), Dr S M Dutta (Industrial Enzymes), Dr R S Pandey (Reproductive Bio-Chemistry), Dr A D Deodhar (Nutritive value of milk and milk products) Biochem. Projects 9, including semen biochemistry, nutritive value of milk and milk products, endocrinology of buffaloes.

Dairy Cattle Genetics: Prof & Head: Dr M Gurnani (Biometrical Genetics); Ph: 2096. Scientists: Dr V V Tripathi (Anim Breeding & Genetics), Dr O S Tomar (Cattle Mgmt), Dr C R Balakrishnan (Cytogenetics). Research Projects: 14, including Breeding dairy cattle for milk production, study on economic traits of bulls on multiherd basis, progeny testing of dairy animals, livestock behaviour, performance of weaned and unweaned calves, calving problems in bovine, systems of housing and feeding management.

Dairy Cattle Nutrition: Prof & Head: Dr D D Sharma (Spl: Rumen Metabolism); Ph: 2832. Scientists: Dr S P Arora, Prof of Eminence (Trace Elements), Dr T Prasad (Trace Elements), Dr B N Gupta (Feed & Fodder Resources). Research Projects: 19, including Animal nutrition, protein and energy requirements for dairy cattle, buffaloes and goats, milk substitutes in calves, enrichment of low grade roughages, fodders and their improvements and evaluation, investigation on pesticides residues and metabolism, forage agronomy: fodder varieties, seed production of lucerne etc.

Dairy Cattle Physiology: Prof & Head: Dr M L Madan (Reproductive Physiology); Ph: 2867. Scientists: M V N Rao (Environmental Physiology), Dr R S Ludri (Lactation Physiology). Research Projects: 11, including Animal Physiology, semen preservation, work production capacity in crossbred bullocks, induced lactation.

Dairy Technology: Prof & Head: Dr S K Gupta (Rheology of Dairy Products); Ph: 2843; Scientists: Dr B N Mathur (Infant Food), Dr S A Singh (Cheese Technology), Dr G S Rajorhia (Indigenous Milk Products), Dr R Balachandran (Frozen &

Concentrated Dairy Products). Research Projects: 13, including Mechanization of indigenous products at village and commercial level, energy conservation in dairy industry; ultrafiltration of buffalo milk for Indian milk products manufacture; standardization and modification of manufacturing technique of Mozzarella cheese; development of appropriate technology for the production of gulabjamun mix powder; use of different food stabilizers in improving the body and texture characteristics of dairy products; utilization of milk preserved by LTH system for the manufacture of UHT processed, fermented and fat rich dairy products; rheology of indigenous dairy products.

Dairy Engineering: Prof & Head: Dr S P Agrawala (Dairy Process Equipment). Scientists: Dr S C Sarma (Refrigeration and New Energy Sources), Mr V P Aneja (Indigenous Dairy Equipment), Mr R D Verma (Thermal Engg), Dr H Abichandani (Scrape Surface Heat Exchangers). Research Projects: 8, including Development and application of direct contact heat exchangers for dairy processing; design and fabrication of continuous ghee making plant, continuous chhana making unit, chilling unit under rural conditions; rural dairy processing equipment, continuous paneer manufacture, systems for storage and compounding animal feeds.

Dairy Economics, Statistics & Management: Prof & Head: Dr B S Rawat (Spl: Business Management); Ph: 2849. Scientists: Prof Kuber Ram (Production Economics), Dr Raj Vir Singh & Dr C B Singh (Agril Economics), Dr Bhopal Singh (Statistics). Research Projects: 16, including Studies on cost of milk production, fodder crops, cost of processing milk and milk products, economics of different milk procurement systems, market process and consumer behaviour, socio-economic surveys for estimation of milk production, statistical surveys on nutritional requirement of dairy animals, estimation of productivity of bovine and forecasting of milk yield of dairy animals, socio-economic surveys of villages and economics of crossbred cattle, economic evaluation of dairy development projects. Bank Officers Training.

Operational Research Projects: "An integrated milk and crossbred production project for increased productivity, employment and income in the villages around Karnal". Commenced in June 1975 and operating in 30 villages; Principal Scientist: Dr R K Patel, Ph: 2621; Scientist: Dr C B Singh.

Dairy Extension: Prof & Head: Dr R L Kherde (Spl: Agril Ext), Ph: 2847. Scientist: Dr K C Tyagi (Organizational Behaviour). Research Projects: 8, including identification and development of rural dairy entrepreneurs and integrated approach for increasing milk production. Extension Services: Field services, AI services, animal health cover, pregnancy diagnosis, advisory services, communication. 12 Extension villages. Industrial Consultancy Cell: For consultancies in Dairy Technology, Dairy Microbiology, Dairy Chemistry, Dairy Engineering and Dairy Cattle Nutrition.

Krishi Vigyan Kendra & Trainers' Training Centre (KVK&TTC): Head & Chief Trg Organiser: Dr T S Sohal (Spl: Farmers' Education), Ph: 2128. Farm Advisory Bureau: Dissemination of knowledge of practical applicability emerging from the research laboratories and farm of the Institute to the field situations.

Krishi Vigyan Kendra: Training Organiser: Mr R M Fulzele (Spl: Agril Ext). Education: Short courses in artificial insemination and veterinary first aid; integrated rural ladies training; management of dairy animals, modern dairy farming practices; goat management; bee keeping; fish farming; duck farming, platform tests of milk, preservation of fruits and vegetables and preparation of milk products. No fee: Free boarding and lodging for farmers of Karnal Dist.

Trainers' Training Centre: Scientist: Dr D S Bhatnagar. Education: Short courses in dairy cattle management and extension technique for KVK teachers, dairy extension programme and quality control; fodder production and utilization, calf rearing and preparation of milk products KVK Home Science teachers, butter and ghee making, ice-cream making, flavoured, sterilized and fermented milks; dairy production practices for veterinary, extension and AH officers, scientific dairy farming

for project officers in tribal development areas and care management and feeding of dairy animals; utilization of frozen semen for AI. Inservice training programmes for Dairy Industries personnel; Courses for defence personnel at Junior and Senior levels. Special tailored courses as per requests, for personnel from Dairy, Veterinary and Animal Husbandry Department.

NATIONAL INSTITUTE OF ANIMAL GENETICS, NDRI Campus, Karnal 132001; Ph: 3918, Gram: Genetics, Tlx: 0396-204 NDRI; Estd: 1984. Dir: Dr Daya Singh Balaine, Ph: 2276 (resi). Education: Dept of Cytogenetics, Head: Dr R Sahai, Ph: 4363; Dept of Immunogenetics, Head: Dr S K Prasad, Ph: 4364. Offers courses in cytogenetics and immunogenetics. Training: Dept of Cytogenetics. Offers short-term and specialized training.

OFFICE OF THE MILK COMMISSIONER, Govt of Haryana -- State Training Centre (Dairying) -- Gurgaon: Offr Incharge: Dr Munish Chander Nagpal; Karnal: Offr Incharge: Dr Sube Singh Hooda.

Himachal Pradesh

HIMACHAL PRADESH KRISHI VISHVA VIDYALAYA, Palampur 176062, Dist Kangra; Ph: 177, Gram: Himkrishi; Estd: 1979; Vice-Chancellor: Dr G C Negi.

College of Agriculture, Solan 173230; Dean: Dr G S Dogra; Associate Prof (Vet & Anim Sc): Dr Y C Jain. Education: Dairy courses offered as part of Anim Sc in BSc (Agri). Extension: Advisory service in dairy farming.

College of Veterinary Sciences, Palampur 176062; Dept of Animal Sc, Prof & Head: Dr K B D Bhowmik. Education: Dairy courses offered as part of animal science in BSc. Extension: Services: Disease diagnosis, management, feed analysis. Training: Short-term training in basic skills, management and nutrition in cattle keeping.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Regional Research Station, c/o Himachal Pradesh Krishi Vishva Vidyalaya, Palampur 176062, Dist Kangra; Ph: 76; Incharge: Dr Lal Krishna. Research: Studies on rumen degradability of protein in common

feedstuffs. Monitoring and surveillance of selected important animal diseases.

Jammu & Kashmir

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Regional Research Station, Rawalpura, Srinagar 190005; Ph: 75527; Incharge: Dr D N Dhar, Ph: 77743 (resi). Research: Production of dictyocaulus filaria vaccine. Epidemiological and immunological studies on helminth infections of domesticated animals in the temperate agro-climatic region of the country. Monitoring and surveillance of selected important animal diseases.

SHER-E-KASHMIR UNIVERSITY OF AGRICULTURAL SCIENCES AND TECHNOLOGY — Summer: Raja Zaman's Bldg, Dalgate, PB No 262, Srinagar 190001; Ph: 73459, Gram: Agrisity; Winter: 45-B Gandhinagar, PB No 87, Jammu Tawi 180004; Ph: 44267, Gram: Agrisity; Estd: 1982. Vice-Chancellor: Dr Allahudin Ahmed.

Faculty of Veterinary Sciences & Animal Husbandry (SKUAST), Srinagar 190001; Incharge Head: Dr Abdul Rashid, Associate Prof-cum-Sr Scientist; Anim Production Div, Head: Dr G M Wani. Education: Dairy science offered as part of Bachelor's Degree in Vet Scs & AH. Extension: Regional Agril Research Station, R S Pora, Jammu; Head: Dr Harbans Singh. KVK Extension Training Centre, Malangpora; Incharge: Dr M P Gupta. Offers short-term training courses.

Karnataka

courses, MSc (Food Sc) by Research and PhD programmes, affiliated to Mysore University.

CENTRAL FROZEN SEMEN PRODUCTION & TRAINING INSTITUTE, Govt of India, Hessarghatta 560088, Bangalore North; Ph: 384272, 27 (Hgt); Laboratory: Ph: 45 (Hgt); Dir: Dr P A Sarma, Ph resi: 53 (Hgt); Asst Res Offr: Dr V K Arora. Offers training only to Govt Sponsored candidates.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Hebbal, Bangalore 560024; Ph: 362509; Jt Dir-cum-Station Incharge: Dr B U Rao, Ph: 362743 (resi). Research: Production of Foot and Mouth Disease vaccine using BHK 21 suspension cell culture technology. Purification and concentration of FMD by PEG precipitation and its application in the improvement of FMD vaccine. Studies on the development of cheaper medium for the growth of FMD virus in BHK 21 cells. Studies on certain modifications on the propagation of FMD virus in suspension cell culture for improving the quality of the vaccine. Freeze drying of FMD virus and its application in vaccine production. Studies on the application of radio labelled immune assay in FMD virus antigen-antibody detection and their correlation with other tests. Research on molecular characterisation of FMD virus and bio-technological aspects for development of immunogens and diagnostics. Interdependency of trace mineral status in soil, feeds and animals in southern region. Trends and differentials in the reported incidence of animal diseases in southern India-A retrospective study. Development, testing and field trial of oil adjuvanted Foot and Mouth Disease vaccine. Sub Projects: 1. Development, standardization and quality assurance of oil adjuvant FMD vaccine. 2. Potency testing and laboratory trial of oil adjuvanted and aluminium hydroxide gel vaccine. 3. (a) Field trial of oil adjuvanted and aluminium hydroxide gel vaccine in Bangalore districts. (b) Field trial of oil adjuvanted and aluminium hydroxide gel vaccine in Bellary district. Statistical Support: Design and development of a remote controlled digital monitoring system for FMD vaccine production technology parameters. Design and development of low frequency electro-magnetic field generator. Design and development of suitable stand by power supply to ultra

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE — Gulbarga: 12 Parawana Bank Colony, Sangameshwarnagar, -585103; Res Programme Coordinator: Dr R K Mahuli; Tiptur: Behind Govt Boys High School, BIRD (K) K R Ext, -572202; Res Programme Coordinator: Dr G R Hegde.

CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, Cheluvamba Mansion, Mysore 570013; Ph: 22660, Gram: Foodsearch, Tlx: 846-241 FTRI IN; Estd: 1950; Dir: Dr B L Amla. Education: Offers MSc (Food Tech)

centrifuge (Sorvall make). Monitoring and surveillance of selected important animal diseases.

KARNATAKA COOPERATIVE MILK PRODUCERS' FEDERATION LTD — Central Training Inst, Behind Bangalore Dairy, Hosur Rd, Bangalore 560029; Ph: 41248; Principal: Dr H Hanumanthappa.

NABARD REGIONAL GRAMIN BANK TRAINING CENTRE, Suvarna Complex, Kulur, Mangalore 575013; Principal: U S Rao.

NATIONAL DAIRY RESEARCH INSTITUTE, Southern Regional Station, Adugodi Post, Bangalore 560030; Ph: 579661-4, Gram: Dairysearch, Tlx: 0845-8397 NDRI IN; Head: Dr S R Sampath, Ph: 575119, resi: 565499.

Departments — Anim Production, Head: Dr G P Chinnaya; Scientists: Dr P V Sarma, Dr M Balakrishnan; Anim Nutrition & Physiology, Head: Dr A Subba Rao; Scientists: Dr K T Sampath, Dr B V Bhaskar; Dairy Tech & Engg, Head: Prof J L Bhanumurthy; Scientists: S A D Prasad, Dr Satish Kulkarni, Dr G R More, H V Venkatesh Murthy, Visweswariah, B V Balasubramanyam, Sudhir Singh; Dairy Bacteriology, Head: Dr A M Natarajan; Scientists: E G Jagannath, N Manjunath; Dairy Chemistry, Head: Dr K M Narayanan; Scientists: Dr M K Ramamurthy, Dr V Unnikrishnan, Dr M K Bhavadasan, Dr B Surendranath, P C Pantulu, N N Balasubramanya; Ext, Head: Dr M N Sinha; Scientists: K Ranganathan, C K Thomas; Economics & Management, Head: Prof J Sitaraswamy; Scientists: Dr (Miss) S Vijayalakshmi, M Anand Kumar, Dr S V N Rao, Dr K M Reddy, Dr V K Kesavan, Dixit; Cattleyard: Dr A Obi Reddy; Agriculture: S R Gawali. Education: (i) Postgraduate Diploma in Quality Control in Dairy Processing; (ii) Postgraduate Diploma in Management of Dairy Enterprises; (iii) PhD offered in Dairy Bacteriology, Dairy Chemistry, Animal Nutrition, Animal Genetics and Livestock Production with course work at NDRI, Karnal. Extension: Services: Veterinary service, feed analysis, farm visits, milk and milk product analysis, consultancy to industries. Training: Offers short courses of 3 months on 'Market Milk Plant Operation' and 'Milk Production'; Nominal fee. Research: New Projects — (i) Improvement of fertility among crossbred cows in organized and rural herd; (ii) Progeny testing of young crossbred bulls

under field conditions; (iii) Studies on the utilization of pretreated and deciled rice bran as an ingredient in the ration of cattle; (iv) Evaluation of the performance of some of the microbial rennets and utilization of whey proteins for the production of cheese spread; (v) System optimization of milk procurement, processing and marketing. Continuing Projects — (i) Role of plasmids in phenotypic expression of lactic acid bacteria; (ii) Studies on enhancing the nutritive and therapeutic value of fermented whey; (iii) Effect of variation in the specific gravities of fat and solids-not-fat on the accuracy of estimation of SNF by lactometric method; (iv) Autoxidation of unsaponifiable constituents and changes in conjugation of polyunsaturated fatty acids of milk fat during storage; (v) Effect of addition of formalin and storage on the composition of cream; (vi) Studies on factors relating to ethanol stability of milk; (vii) Lipoprotein lipase activators and inhibitors in milk lipolysis; (viii) A dual gauge and monitor for detergent concentration and temperature; (ix) Analytical studies of dairy effluent treatment in upgraded oxidation ponds with additional surfaces; (x) Development of data bank on degradability of protein of ingredients of dairy cattle feeds; (xi) Biconversion of crop residues.

UNIVERSITY OF AGRICULTURAL SCIENCES, Post Bag No 2477, Hebbal, Bangalore 560024; Ph: 365383, Gram: Univagris; Estd: 1965; Vice-Chancellor: Dr S V Patil. Dir of Instruction: Dr C K Abdulla Khan; Dir of Extension: Dr K A Jaliha; Dir of Res: Dr K Krishnamurthy.

UNIVERSITY OF AGRICULTURAL SCIENCES, Dharwad 580005; Vice-Chancellor: Dr J V Goud.

College of Veterinary Sciences, Krishinagar, Dharwad 580005; Ph: 80191-80197, Gram: Univagris; Estd: 1947. Education: Div of Anim Scs, Dept of Anim Genetics & Breeding, Prof: Dr P Basavaiah, Ph: 80192. Extension: Services: Vaccination, disease diagnosis, management, feed analysis, mobile extension units. Training: Div of Anim Scs. Offers short-term training in basic skills and imparts practical training to lay inseminators. Research: Regional Research Station, Dharwad 580005; Geneticist: Dr P Basavaiah. All

India Coordinated Research Project on Buffaloes.

Dairy Science College, Hebbal, Bangalore 560024; Estd: 1980; Dir of Instruction: Dr K Trivikrama Rao. Departments — Dairy Technology, Prof & Head: Dr K Atmaram; Dairy Microbiology, Prof: Dr H Laxminarayana; Dairy Chemistry; Dairy Engineering; Dairy Production. Education: BSc (Dairy Tech), MSc (Dairy Tech/Dairy Microbiology/Dairy Chemistry), also as part of Anim Sc course at graduate and postgraduate level; short-term training courses in Dairy Production.

Veterinary College, Hebbal, Bangalore; Dir of Instruction: Dr A V Rai.

Kerala

DAIRY TRAINING CENTRE (Dept of Dairy Development), Arakkinar PO, Calicut 673028; Principal: K K Nambuthiripad, Dep Dir. Training: Offers short-term training courses of one month, twelve days and six days duration for dairy farmers, personnel of dairy cooperatives and educated unemployed. Daily allowance and stipends offered.

DAIRY TRAINING CENTRE (Dept of Dairy Development), Vadavathoor, Kottayam; Principal: P A Philipose. Training: Offers short-term training courses for dairy farmers, personnel of dairy cooperatives and educated unemployed.

GOVERNMENT OF KERALA, AH Dept — Livestock Training Centres — Kodappanakunnu, Trivandrum; Mundayad 670597, Cannanore Dist; Principal Trg Offr: Dr P P Krishna Iyer.

KERALA AGRICULTURAL UNIVERSITY, Main Campus Vellanikkara, Mannuthy 680651, Trichur Dist; Ph: 23034, Gram: Agrivarsity; Estd: 1972; Vice-Chancellor: T Madhava Menon, IAS; Dean: Dr M Krishnan Nair.

College of Veterinary & Animal Sciences, Mannuthy 680651; Ph: 22344; Estd: 1955. Dean: Dr M Krishnan Nair. Departments — Dairy Science, Prof & Head: Dr M Subrahmanyam; Nutrition, Head: Dr E Sivaraman; Extension, Head: Dr P S Pushkaran; Pathology, Head: Dr A Rajan; Microbiology, Head: Dr S Sulochana; Parasitology, Head: Dr C K Rajamohan; Animal Reproduc-

tion, Head: Dr C P Neelakanta Iyer; Preventive Medicine, Head: Dr E P Paily; Animal Management, Head: Dr T G Rajagopalan. Education: Dairy Sc offered as part of BVSc course and MVSc & PhD. Extension: Services: Vaccination, Disease diagnosis, Cattle management, Feed analysis, Mobile extension unit, Sterility camps, Artificial insemination, Exhibitions and Seminars conducted. Training: Short-term training courses for personnel of State Dept of AH, Dairy Federations, candidates sponsored by private organizations and farmers. Duration from 2 weeks to one month. Fee charged, No stipend.

KERALA LIVESTOCK DEVELOPMENT AND MILK MARKETING BOARD LTD, Training Centre, Bull Station, Madupetti PO, near Munnar; Ph: 389, Gram: Indoswiss.

Madhya Pradesh

CENTRAL INSTITUTE OF AGRICULTURAL ENGINEERING (ICAR), Guru Tegh Bahadur Complex, Additional 'A' Block, New Market, T T Nagar, Bhopal 462003; Ph: 63618, Gram: Kriyantra, Tlx: 0705-273; Dir: Dr T P Ojha, Ph: 67384 (resi).

JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA, Krishinagar, Adhartal, Jabalpur 482004; Ph: 23771, Gram: Krisivisva; Estd: 1964; Vice-Chancellor: Dr D K Sharma, Ph: 23974.

Faculty of Agriculture, Dean: Dr V S Shukla; Faculty of Vet Sc & AH, Dean: Dr B S Malik, Ph: 25783, 22210 (resi); Faculty of Agricultural Engg, Dean (Acting): Dr H R Tyagi; Dir of Instructions: Dr S N Dubey; Dir of Research Services: Dr G P Verma; Dir of Extension Services: Vacant.

College of Veterinary Science and Animal Husbandry, Anjora, PB No 6, Durg 491001; Dean: Dr B G Katpatal.

College of Veterinary Science and Animal Husbandry, South Civil Lines, Jabalpur 482001; Ph: 25302, Gram: Vetycollege; Estd: 1948; Dean: Dr B S Malik. Departments — Anim Production & Management, Head: Dr B K Dave; Vet Medicine, Head: Dr K N P Rao; Ambulatory Clinic, Head: Dr J L Soni; Extension, Head: Dr I K Dwivedi; Vet Pathology, Head: Dr J L

Vegad; Anim Genetics & Breeding, Head: Dr B G Katpatal; Anim Nutrition & Food Technology, Prof & Head: Dr B R Patel; Vet Parasitology, Prof & Head: Dr H L Shah; Anatomy, Head: Dr A M Shrivastava; Biochemistry, Head: Dr I C Dutta; Physiology, Head: Dr S K Saxena; Pharmacology, Head: Dr G C Parasar; Microbiology, Head: Dr P G Dhawedkar; Surgery, Head: Dr S K Pandey; Obstetrics & Gynaecology, Head: Dr K G Kharchey; Statistics, Head: K C Rao; AICRP Poultry Project, Head: Dr A G Khan. Education: Dept of Anim Prod & Mgmt: Offers PG diploma, degree, postgraduate degree in Dairy Husbandry. Dept of Vet Pathology: Offers full-fledged courses in pathology at both graduate and postgraduate level; Dept of Anim Nutrition & Food Tech: Offers graduate and postgraduate courses in nutrition; undergraduate & postgraduate teaching in all Depts. Extension: Services: Vaccination, food technology training, disease-diagnosis, post-mortem, mobile extension units, feed analysis: No fees.

College of Veterinary Science & Animal Husbandry, Mhow 453441; Ph: 622, Gram: Vetcollege; Estd: 1955; Dean: Dr K S Johar, Ph resi: 240. Departments -- Anim Production: Dr M M Dhingra; Nutrition: Dr M U Bhaid; Extension: Dr R M Bakshi; Biochemistry: Dr R C Dhir; Physiology: Dr S C Adaval; Pharmacology: Dr D V Shilaskar; Anatomy: Dr G P Tiwari; Microbiology: Dr P N Pathak; Parasitology: Dr P C Jain; Pathology: Dr V S Richhariya; Medicine: Dr P G Supekar; Surgery: Dr S K Nakra; Obstetrics & Gynaecology: Dr R A S Chouhan; Statistics: I S Chhabra; Anim Breeding & Genetics: Dr F H Khan. Education: Four-year course leading to BVSc & AH degree. Two-year postgraduate courses leading to MVSc & AH degree. Extension: Services: Vaccination, castration of scrub bulls, disease diagnosis, post-mortem, feed analysis, fodder cultivation; No fee; Extension lectures for progressive farmers; Radio talks over AIR; Farm and village visits under taken; Ambulatory clinic van available; AI services available free.

College of Agriculture, Raipur 492006; Ph: 24608; Dean: Dr M M Rai. Dept of Animal Production & Management, Asst Prof & Head: Dr P K Jain; Offers under-

graduate course on production & management. Extension services available. KRISHI VIGYAN KENDRA & TRAINERS' TRAINING CENTRE, c/o Kasturba Gandhi National Memorial Trust, Kasturbagram, Indore 452020; Ph: 5265, Gram: Kasturbagram; Estd: 1950. Secretary: Dr Santosh Goindi; Chief Training Organiser: Dr W R Deshpande. Extension: Services: Vaccination, Disease diagnosis, Management, feed analysis, farm units, mobile extension units. Training: Short-term courses for farmers/farm women in management and nutrition.

RAYMOND'S EMBRYO RESEARCH CENTRE, Gopalnagar 495663, Dist Bilaspur, MP; Ph: 3181, 4348, Gram: Rayolagram, Tlx: 775-245 RCW IN; Exec Dir: N R Ramaprasad; Mgr: Dr S G Zawar.

Maharashtra

ANAND NIKETAN COLLEGE OF AGRICULTURE, Warora 442914, Dist Chandrapur. Dept of AH & Dairy Sc, Head: Dr R G Naolakhe. BHARATIYA AGRO-INDUSTRIES FOUNDATION (BAIF), 'Kamdhenu', Senapati Bapat Marg, Pune 411016; Ph: 52621-3, Tlx: 0145-283, Gram: Baifon; Estd: 1967; Dir: Dr Manibhai Desai; Chief Exec: Dr D S Gorhe; Sec & Finance Mgr: M R Marathe; Anim Health Div, Gen Mgr: Dr N S Datt; Addl Gen Mgr: Dr B S Rajya; Exec Sec (Mgmt & Corporate Plg): K A Chaukar; Exec Sec (Agro-Forestry & Farm Mgmt): N G Hegde; Exec Sec (Finance & Personnel): S B Zaware; Res Programme Organiser (R & D): Dr D V Rangnekar; Central Res Station, Res Programme Coordinator: Dr B R Mangurkar. Offr on Spl Duty, New Delhi: Dr A C Mathur, Ph: 652903. Objectives: BAIF is a research organization working for the development of the rural man through application of science and technology. It operates over 200 rural development centres in Maharashtra, Karnataka, Gujarat, Rajasthan, Madhya Pradesh and Uttar Pradesh. BAIF is recognized as (i) Project holder by GOI for bilateral overseas assistance; (ii) R & D laboratory by GOI's Dept of So & Tech; (iii) Affiliate institute for PG studies in agriculture and animal sciences by Mahatma Phule Krishi Vishwavidyalaya, Rahuri; and (iv) Institute for PG studies and

research in microbiology, reproductive physiology, nutrition and biochemistry by the Univ of Poona and Konkan Krishi Vidyapeeth, Dapoli. Marketing Div: Hundekari Garage Bldg, 408/1 Swargate, Pune 411037; Ph: 37776. Regional Offices: Gujarat (Ahmedabad), Karnataka (Gulbarga, Tiptur), Rajasthan (Bhilwara), Uttar Pradesh (Allahabad, Lucknow).

BAIF Research Institute for Cattle and Agricultural Development (BRICAD), Urlikanchan 412202, Pune Dist; Ph: 248, 265. Dir: Dr Manibhai Desai; Chief Exec: Dr D S Gorhe; Adviser, Cattle Dev: Dr M R Marathe; Res Programme Organizer: Dr D V Rangnekar; Res Projects: Animal genetics, nutrition, land and water conservation, fodder and energy plantation, vet biologicals including FMD vaccine and vet pharmaceuticals.

BAIF Research Institute for Animal Health (BRIAH), Briahnagar, off Pune-Nagar Rd, PB No 1, Wagholi 412207, Pune Dist; Ph: 70408/9; Gen Mgr: Dr N S Datt; Addl Gen Mgr: Dr B S Rajya.

DAIRY SCIENCE INSTITUTE, Govt of Maharashtra, Aarey Milk Colony, Bombay 400065; Ph: 692728; Principal: Dr D V Tilve. Education: Offers Indian Dairy Diploma in Dairy Technology, IDD (DT).

DIRECTORATE OF ANIMAL HUSBANDRY, Govt of Maharashtra, Dapchhari, Tal Dahanu, Dist Thane; Principal: S V Danayat, Ph: 40, Gram: Milk. Diploma Course in Dairy Management & Animal Husbandry.

KONKAN KRISHI VIDYAPEETH, Dapoli 415712, Ratnagiri. Estd: 1972; Vice-Chancellor: Dr P V Salvi, Ph: 64, 15 (resi).

Faculty of Agriculture, Dean: Dr S B Kadrekar; Head, Dept of AH & Dairy Sc: Prof S V Majgaonkar, Ph: 25, 94 (resi). Education: Offers postgraduate course leading to Agriculture in Dairying.

Bombay Veterinary College, Parel, Bombay 400012; Ph: 4131180, 4137030, 4132792, Gram: Bovet; Estd: 1886. Associate Dean: Dr P D Sardeshpande, Ph: 4130162. Education: Dept of Pathology, Parasitology & Microbiology, Prof & Head: Dr S M Niphadkar; Dept of Pharmacology, Medicine, Prof & Head: Dr L K Kadvekar; Dept of Nutrition, Physiology & Anatomy, Prof & Head: Dr B A Kulkarni; Dept of Anim Production, Poul Sc, Extn & Dairy Sc, Prof & Head: Dr N S Tadpatrikar. Dairy cattle production and dairy science offered as

major fields of specialization of two-year postgraduate degree course in Anim Sc. Extension: Services: Vaccination, disease diagnosis, advisory services on management, feed analysis.

MAHATMA PHULE KRISHI VIDYAPEETH, Rahuri 413722, Ahmednagar Dist; Ph: 65, Gram: Krishivid; Vice-Chancellor: Dr N G Perur.

Faculty of Animal Science & Dairy: Dean: Dr I G Chauhan; Dept of Anim Sc, Head: Dr E N Sangle. Extension: Dept of Agril Extn, Head: Dr T S Khuspe; Services: Vaccination, disease diagnosis, management, feed analysis, farm units, mobile extension units; No fee. Research: AICRP on Cattle Breeding.

College of Agriculture, Kolhapur 416004; Ph: 5341, Gram: Prinagri. Extension: Dept of Agril Extn, Head: Prof Y B Joshi; Guidance to establish farms, arranging seminars, etc. Training: Livestock Supervisors' Trg one year course; Dept of Anim Sc & Dairy Sc, Head: Prof E M Sangle; One year certificate course in basic skills, management, nutrition.

College of Agriculture, Pune 411003; Ph: 57091, Gram: Prinagri; Estd: 1907. Education: Div of Anim Sc & Dairy Sc, Prof: Dr N D Belhe. Dairy Science offered as part of BSc (Agri); Postgraduate studies in Animal Science.

MARATHWADA AGRICULTURAL UNIVERSITY, Parbhani 431402; Ph: 301, Gram: University; Estd: 1972. Vice-Chancellor: Dr N G P Rao.

College of Veterinary & Animal Sciences, Parbhani 431402; Ph: 301/24; Estd: 1972; Dean: Dr M A Ghafoor. Education: Dept of Dairy Sc, Head: Dr A F Lembhe; Dairy Sc offered as part of BVSc & AH and as a fullfledged course in MVSc (Dairy Sc); 2 year Livestock Supervisor's Diploma. Extension: All Vet & AH services including mobile extension unit.

College of Agriculture, Parbhani 431402; Ph: 301, Gram: Prinagri; Estd: 1956. Education: Dept of AH & Dairying, Prof & Head: Dr S G Rotte; Associate Profs: Dr P M Patel, Dr P S Waghmare, Dr P M Khedkar; Asst Profs: A S Pawar, L M Karanjkar, S B Lad, P N Zanjad, A N Kulkarni, Hassan Bin Awaz, R P Barbind, N V Jogalekar. Dairy Science offered as part of Animal Science in graduate and postgraduate degree courses including PhD.

College of Agricultural Technology (Food

Technology), Parbhani 431402; Ph: 301/50; Estd: 1976; Associate Dean & Principal: Dr U M Ingle. Departments — Biochemistry & Nutrition; Food Sc & Tech; Anim Products Tech; Food Engg; Food Microbiology. Education: Offers courses in BTech (Food Sc) with basic courses in Microbiology, Biochemistry, General Engg, Dairy Tech, Quality Control, Human Nutrition and MTech (Food Sc) with courses. Also Dairy Sc, Dairy Tech, Dairy Hus at undergraduate, MSc & PhD level. Extension: Group Discussions, radio talks, field demonstrations, demonstrations through youth clubs, etc. Training: Farmers/farm women, Gramsevakas, education in food and nutrition.

PUNJABRAO KRISHI VIDYAPEETH, Krishinagar, Akola 444104; Ph: 5372, Gram: University, Tlx: 0725-215 PKV IN; Estd: 1969. Vice-Chancellor: Dr H B Ulemale, Ph: 5365, 5184 (resi).

Faculty of Agriculture, Akola 444104; Ph: 5493; Dean: Dr W B Rahudkar, Ph: 5263 (resi). Education: Dept of AH & Dairy, Prof & Head: Prof V M Gorantiwar, Ph: 4471, Ext 16; Offers courses as part of BSc (Agri) and MSc (Agri) in Animal Husbandry & Dairying. Extension: Dir of Ext Education: Prof V T Rahate, Ph: 4471, Ext 24; Services: Offers regular courses in dairy management, correspondence course in dairy business, disease diagnosis camps. Training: Krishi Vigyan Kendra, Dept of AH & Dairying; Offers training in scientific dairy farming for farmers and self employed. Training in forage production, management of dairy animals, calves and dry stock, training in milk and milk products.

Nagpur Veterinary College, Seminary Hills, Nagpur 440006; Ph: 32159, Gram: Vetycollege; Associate Dean: Dr M K Joshirao. Education: Dept of Anim Nutrition & Dairy Sc, Head: Dr M R Kaduskar; Reader: Dr B S Thakur; Dept of Anim Genetics & Breeding, Prof & Head: Dr R N Deb; Dept of Anim Husbandry, Head: Dr V R Thatte; Dept of Pathology, Head: Dr S S Bhagwat; Dairy Sc offered as part of Anim Sc course. Extension: Dept of Ext, Head: Dr P B Saigaonkar; Offr Incharge, Vet Polyclinic: Dr R C Kunthawar; Services: Disease diagnosis and treatment.

RESERVE BANK OF INDIA COLLEGE OF AGRIL BANKING, Ganeshkhind Rd, Pune 411016; Ph: 53292; Principal: Sugavanam.

Meghalaya

ICAR RESEARCH COMPLEX FOR NORTH EASTERN HILLS REGION, Mawlai, Shillong 793003; Ph: 23748, Gram: Agricomplex. Education: Div of Anim Production, Head: Dr S C Saxena, Ph: 26340 (resi); Incharge — Breeding: Dr S C Saxena; Nutrition: Dr Arun Verma; Pathology: Dr N D Verma; Ext: Dr D S Chauhan. Extension: Div of Agril Extn, Lower Lauchemiere, Shillong 793001; Head: Dr D S Chauhan. Services: Vaccination, disease diagnosis, feed analysis, post-mortem; farm visits undertaken.

Nagaland

DIRECTORATE OF VETERINARY & ANIMAL HUSBANDRY, Govt of Nagaland, VFA Trg Inst, Medziphema; Principal: Dr M M Thomas. Offers training of 12 months duration. KRISHI VIGYAN KENDRA & TRAINERS TRAINING CENTRE IN HILL AGRICULTURE, ICAR Res Complex, Jharnapani, PO Ghaspani 797106; Principal IETC & Incharge: B S Rana.

Orissa

INSERVICE TRAINING CENTRE, Dept of AH, Govt of Orissa, Bhanjanagar 761126. ORISSA UNIVERSITY OF AGRICULTURE & TECHNOLOGY (OUAT), Bhubaneswar 751003; Ph: 50732, Gram: Agritech; Vice-Chancellor: K Ramamurthy.

Faculty of Veterinary Science & Animal Husbandry, Dean: Dr N C Panda; Faculty of Extension, Head: Dr S N Das. Education: Departments — Anim Breeding & Genetics, Prof & Head: Dr B N Patro; Anim Nutrition, Prof & Head: Dr N C Panda; Anim Production, Prof & Head: Dr M Mishra; Vet Pathology, Prof & Head: Dr B C Nayak; Bacteriology, Prof & Head: Dr S N Panda; Parasitology, Prof & Head: Dr S C Mishra; Vet Medicine, Prof & Head: Dr S B Tripathy; Vet Surgery, Prof & Head: Dr A K Mitra; Vet Gynaecology,

Prof & Head: Dr B N Mohanty; Biochemistry, Pharmacology & Physiology, Reader & Head: Dr T L Murty; Vet Anatomy, Reader & Head: Dr L N Das. Offers courses leading to BVSc, MVSc and PhD degrees. Extension: Services: Disease diagnosis, feed analysis, vaccination, post-mortem, consultancy.

Punjab

DAIRY DEVELOPMENT DEPARTMENT, Govt of Punjab -- General Trg Centres -- Faridkot: Dashmesh Nagar, Basti Gobind Nagri; Gurdaspur: Civil Lines Rd; Jalandhar: R-634 Model Town; Ludhiana: Kothi No 5, Model Gram; Ropar: Granthi Bagh; Sangrur: New Mubarak Kothi. Training Units: Bija (Khanna, Ludhiana) & Dasuya (Hoshiarpur).

NATIONAL DAIRY DEVELOPMENT BOARD, Northern Regional Demonstration & Training Centre (RD & TC), G T Rd, Bye-Pass, Near Milk Plant, Jalandhar 144008; Ph: 79188, 73546, 74730, Gram: Dairyboard; Principal: B K Garg; Staff: A A Bhati, P K Mehta, Dr S M Tikyani, A K Thakur. Training Programmes: Milk Proc & Tech Inputs; AI Trg for Lay Inseminators; Quality Control; Orientation for Society Managing Committees, Trainers' Training Programme.

PUNJAB AGRICULTURAL UNIVERSITY, Ludhiana 141004; Ph: 22960, Gram: Agriversity, Tlx: 386-473; Estd: 1962; Vice-Chancellor: Dr Sukhdev Singh; Faculty of Agri, Dean: Dr Dalbir Singh Dev, Ph: 22960 Ext 365.

College of Agriculture, Ludhiana 141004. Education: Dept of Anim Sc, Head: Dr M S Tiwana, Ph: 22960 Ext 307; Dairy Sc offered as part of Animal Sc at MSc and PhD levels. Dept of Food Sc & Tech, Head: Dr K S Sekhon, Ph: 22960 Ext 305; Offers Diploma in Dairy Tech. Extension: Dept of Anim Sc. Services: Vaccination, Disease diagnosis, management, feed analysis, mobile extn units, etc. Training: Dept of Extn Education, Head: Dr A N Shukla, Ph: 22960 Ext 321; Offr Incharge of Trg: Dr A S Dhaliwal. Offers 3-5 courses of 10 days duration in basic skills, management and nutrition.

College of Veterinary Science, Ludhiana 141004; Ph: 22960, Gram: Agriversity. Estd: 1969; Dean: Dr Balwant Singh, Ph: 22960, Ext 210, 26309 (resi). Education:

Departments -- Anatomy, Head: Dr K S Roy, Ph: Ext 230; Bacteriology & Virology, Head: Dr S N Sharma, Ph: Ext 229; Vet Medicine, Head: Dr S S Rathor, Ph: Ext 226; Pharmacology, Head: Dr M S Bal, Ph: Ext 366; Parasitology, Head: Dr Sawai Singh, Ph: Ext 227; Vet Pathology, Head: Dr P P Gupta, Ph: Ext 324; Physiology, Head: Dr P J S Rattan, Ph: Ext 228; Surgery & Radiology, Head: Dr S S Rathor, Ph: Ext 325; Obstetrics & Gynaecology, Head: Dr R D Sharma, Ph: Ext 225; Vet Public Health, Head: Dr D V Joshi, Ph: Ext 275; Dir, Vet Clinic: Dr D C Dhablania, Ph: Ext 363. Offers courses leading to BVSc & AH, MVSc, PhD degrees. Extension: Services: Vaccination, disease diagnosis, management, feed and food analysis, mobile units. Training: Dept of Surgery & Radiology, Offr Incharge: Dr S S Rathor, Ph: Ext 325; Offers Refresher Training Course for the technical field staff of the AH Dept.

Rajasthan

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE, Near Overhead Water Tank, Ropalganj, Philwara 311001; Sr Res Scientist: Dr M S Sharma.

CENTRAL ARID ZONE RESEARCH INSTITUTE, Jodhpur 342001; Ph: 21984, Gram: Aridzone; Dir: Dr H S Shankaranarayana. Extension & Training: Div of Ext & Training, Head: Dr K N K Chauhan; Offers 8-10 days training courses; Services: Vaccination, farm visits undertaken. Div of Anim Studies, Head: Dr J P Mittal; Scientists: Dr B K Mathur, Dr H C Bohra; Offers advisory services to farmers, etc; Services: Disease diagnosis, feed analysis, training.

INSERVICE TRAINING CENTRE, Dte of AH, Govt of Rajasthan, Jaipur 302017; Asst Dir: Dr P K Tak, Ph: 73237. Centres: Jodhpur, Kota, Udaipur.

LIVESTOCK FIELD INVESTIGATION STATION, Govt of Rajasthan, Bassi 303301, Jaipur Dist; Offr Incharge: Dr A K Purchit.

SUKHADIA UNIVERSITY, Udaipur 313001; Ph: 23597, Gram: University; Estd: 1962; Vice-Chancellor: Dr K N Nag; Dir of Ext Education: Dr S L Mathur; Dir of Res: Dr H G Singh.

College of Dairy Science, Udaipur 313001; Ph: 23719, Gram: Colofdairy; Estd: 1982; Dean: Dr V V Sharma. Education: Dept of Dairy Chemistry, Head: Dr R K Yadav; Dept of Dairy Tech, Incharge: J M Bathla; Dept of Bacteriology, Incharge: Dr S K Garg; Dairy Engineer: R K Muralia; Dairy Plant Mgr: M S Rathore. Offers 4/5-year BSc degree course in Dairy Tech.

College of Veterinary & Animal Sciences, Bikaner; Ph: 178, Gram: Rajvetcol; Estd: 1954; Dean: Dr C S Mathur. Education: Dept of Anim Production, Head: Dr C S Mathur; Offers full-fledged two-year MVSc course in dairy science. Extension: Services: Vaccination, disease diagnosis, feed analysis, etc. Training: Short-term courses in basic skills, management, nutrition; Qualifications: BVSc & AH and Inservice candidates of the Dept of AH, VAS and AHEOs; No fees.

Rajasthan College of Agriculture, Udaipur 313001; Ph: 4335, Gram: Rajcolagri; Estd: 1955; Dean: Dr M S Manohar. Dept of Dairy Science, Head: Dr R S Rawat; Assoc Prof (Dairy Sc): Dr R K Yadav; Dept of Anim Production, Head: Vacant. Education: BSc (Dairy Tech), MSc & PhD in Dairy Sc & Dairy Husbandry. Extension: Farm units, mobile extension units; No fee. Training: Short-term courses in basic skills, management, nutrition, etc for farmers, Agril Offrs of Dept of AH and banks.

S K N College of Agriculture, Jobner 303329; Ph: 22, Gram: Agricol; Estd: 1947; Dean: Dr R C Mehta. Education: Dept of Dairy Sc, Prof & Head: Dr V B Singh. Extension: Dept of Ext Education, Prof & Head: Dr B M Sharma; Services: Training, livestock health, AI, consultancy, milk product manufacture, milk and milk product analysis.

Tamil Nadu

ANNAMALAI UNIVERSITY, Annamalai Nagar 608002; Ph: 2451 CDM; Faculty of Agri, Dean: Dr S Chandrasekaran. Education: Dept of Agronomy, Div of AH, Incharge, Dairy & Vet Hospital: Dr M R Vairavan. Offers Dairy Sc and Forage Production as part of BSc (Agri) course.

CHRISTIAN MEDICAL COLLEGE & HOSPITAL, Ida Scudder Rd, Vellore 632004; Ph: 22102, Gram: Mission Hos; Estd: 1900; Dir: Dr L B M Joseph. Dept of Rural Health and Social Affairs (RUHSA), Ruhsa Campus PO, K V Kuppam 632209, Gudiyatham T K, North Arcot Dist; Ph: 52, 53, 54 (K V Kuppam), Gram: Ruhsa. Education: AH Section, Head: Dr Lawrence Sebastian; Res & Trg, Head: M R Narayan; Social Education & Dev, Head: Dr Abel. Extension: AH Section, Head: Dr Lawrence Sebastian; Services: Vaccination, management, feed analysis, AI, mobile extension units. Training: Consultancy Evaluation Res & Trg Section, Head: M R Narayan; Offr Incharge, Trg: Dr Thomas P Benjamin; Offers short-term vocational training in dairy management, nutrition and basic skills.

NATIONAL DAIRY DEVELOPMENT BOARD, Southern Regional Demonstration & Training Centre (RD & TC), Vasavi College Post, Erode 638316; Ph: Chithode 60, Gram: Dairy-board; Principal: Dr S Sreedharan, Ph: Chithode 40 (resi). Training: Offers training in Milk Procurement and Technical Inputs, AI & Vet First Aid; Orientation for village dairy cooperative management committee members and custom made programmes.

TAMIL NADU AGRICULTURAL UNIVERSITY, Coimbatore 641003; Ph: 35461, Gram: Farmvar; Estd: 1971. Vice-Chancellor: Dr V Rajagopalan; Dir of Ext: Dr A John Knight.

Agricultural College & Research Institute, Coimbatore 641003; Ph: 35461, Gram: Farmvar; Education: Dept of AH, Prof & Head: Dr T Sivaraman; Dairy Sc offered as part of BSc (Agri), ME (Agri), MSc (Agril Ext); Courses — BSc (Agri): Anim Mgmt, Intro to Dairy Sc, Dairy Cattle Mgmt, Mixed Farming-Anim Production, Dairy Products; Dairy Tech in ME (Agri) and MSc (Agri); 9 months certificate course for Livestock Assts; 30 days training for army personnel in Dairy Cattle Mgmt; Correspondence Course in Dairying for 3 months; Dairy lessons on AIR. Training: Dept of AH; Head: Dr T Sivaraman; Assoc Profs Incharge of Trg: Dr R Subramanian, Dr L Damodharan, Dr Krishnamurthy, Dr Khadhar Khan.

Institute of Animal Nutrition, Kuttupatham 603203.

Livestock Research & Development Centre, 17 Samiappa St, Thirunagar Colony, Erode

638003; Assoc Prof & Head: Dr S Nagarajan.

Madras Veterinary College, Vepery, Madras 600007; Ph: 31506, Gram: Vetdean; Estd: 1903; Dean: Dr P Kothandaraman. Education: Dept of Dairy Sc, Prof & Head: Dr M Mohamed Habibullah Khan; Offers MVSc & PhD in various disciplines of Dairy Sc under the trimester system pattern. Extension: Dept of Ext, Head: Dr S Jothiraj; Assoc Prof: Dr K M Selvaraj; Communication Centre, Assoc Prof & Head: Dr K N Nazir Ahmed Khan. Training: Correspondence course in 'Milk Products' in Tamil for 3 months along with practical experience.

Veterinary College & Research Institute, Mohanur Rd, Namakkal 637002; Estd: 1985; Dean: Dr R Ramamurthi. Education: Dept of Livestock Production & Management, Head: Dr G Ramalingam; Offers courses in Dairy Sc. Training: Offers long-term training in Dairy animal management.

Uttar Pradesh

ALLAHABAD AGRICULTURAL INSTITUTE, PO Agril Inst, Allahabad 211007; Ph: 7210, Gram: Agrinst; Estd: 1911; Dir: Dr Y B Singh; Principal: Dr T Vishwas Rao; Vice-Principal: Prof S J Singh; Dept of AH, Head: Prof O P Agarwala; Dept of Dairy Tech, Head: Dr O Brave; Dept of Ext, Head: Dr B K Chaubey. Education: Indian Dairy Diploma (IDD), MSc Agri (Dairy Tech), PhD in Dairy Sc. Extension: Offers non-formal training programme in rural development with special reference to rural leadership and income generating programmes.

BANARAS HINDU UNIVERSITY, Institute of Agril Sciences, Varanasi 221005; Ph: 54291 Ext 488, Gram: Hinduvarsity; Estd: 1961. Education: Dept of AH & Dairy Sc, Head: Dr K N Pandey; Livestock Farm Mgr: Dr S C Sinha; Postgraduate degree in Dairy Sc. Extension: Dept of Ext Education, Head: Dr B D Pande, Ph: 54291 Ext 448. Services: Disease diagnosis, feed analysis, management. Training: Dept of AH & Dairying; Courses in management and nutrition. Research: Dairy Tech and Anim Nutrition.

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE—BAIF UP Programme. Allahabad: 187-B, Near Gole Park, Attarsuiya, -211003; Res Programme Coordinator: Dr S B Gokhale; Lucknow: B-191, Sector 'A', Mahanagar, -226006; Jt Exec Sec: Ramesh Rawal.

CENTRAL INSTITUTE FOR RESEARCH ON GOATS, Makhdum, PO Farah 281122, Dist Mathura; Ph: 51 (Farah), Gram: Vetex; Dir: Dr N K Bhattacharya. All India Coordinated Research Project on Goats (For Milk, Meat and Fibre); Proj Coordinator: Dr R K Misra. CHANDRA SHEKHAR AZAD UNIVERSITY OF AGRICULTURE & TECHNOLOGY, Kanpur 208002; Ph: 44466, Gram: Agriversity; Estd: 1975; Vice-Chancellor: Sayeed Shumshad Ahmed; Dean: Dr N S Kushwaha; Dept of AH & Dairying, Assoc Prof: Dr H B Dwivedi. Education: Dairy Sc offered as part of BSc (Agri) & MSc (Agri) and Dairying; facilities available for PhD in AH and Dairying. Extension: Services: Formation of breeding and milk procurement and handling societies, Insemination, Pregnancy diagnosis, Disease control, vaccination, feed analysis and advise for establishing a dairy unit. Training: Training of cooperative secretaries; Short-term training in Anim production.

College of Veterinary Science & Animal Husbandry, Mathura Campus, Mathura 281002; Ph: 148, 113, Gram: Vetcol; Estd: 1947; Dean: Dr B P Singh. Education: Dept of Dairying, Head: Dr R C Upadhyaya, Ph: 33; Dairying is part of FVSc & AH and an optional subject at postgraduate level. Extension: Anim Hus Ext Dept, Head: Dr P C Yadav; Services: Vaccination, treatment of sick animals; Dept of Parasitology, Supervisor: Dr S S Ahluwalia; Parasitological Control Unit Scheme diagnostic & advisory services on parasitic diseases. Training: Short-term courses in dairy farming for ex-army personnel.

G B PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY, Pantnagar 263145, Nainital Dist; Ph: 2, Gram: Pantvarsity; Estd: 1960; Vice-Chancellor: Kripa Narain, IAS (retd)

College of Agriculture, Pantnagar 263145; Ph: 2 Ext 22; Dean: Dr R P Chaudhary; Dept of Anim Sc, Head: Dr M L Verma; Anim Breeding: Dr O P Sharma; Anim Nutrition (Feed Analysis): Dr D G Naik. Education: MSc (Agri) Dairy Husbandry, MVSc (Dairy Husbandry), PhD Anim Breeding & Anim Nutrition with problems in Dairy Cattle.

Training: Short-term training programmes in Farm management, urea treatment of wheat straw. Research: Behaviour pattern of crossbreds in relation to growth and milk production under tarai conditions; conservation of Sahiwal breed at Pantnagar; AICRP on utilization of agricultural by-products and industrial waste materials for evolving economic rations for livestock.

College of Veterinary Science, Pantnagar 263145; Gram: Pantvarsity; Estd: 1960; Dean: Dr I P Singh. Education: Dept of Vet Med, Head: Dr H C Joshi, Ph: 622; Dept of Pathology, Prof & Head: Dr N P Singh; Dept of Physiology, Assoc Prof & Head: Dr M Mohsin. Extension: Incharge: Dr H C Joshi. Services: Vaccination, disease diagnosis, AI, management, feed analysis, mobile extension units. Training: Short-term courses for educated employed and defence personnel covering all aspects of breeding, feeding, management and disease control; No fee. Research: Clinical studies on micro-filariasis in animals with special reference to sero-diagnosis and chemotherapy.

INDIAN GRASSLAND & FODDER RESEARCH INSTITUTE, Pahuji Dam, Jhansi-Gwalior Rd, Jhansi 284003; Ph: 908, Gram: Ghas-anusandhan, Tlx: 326-241; Estd: 1962; Dir: Dr Panjab Singh, Ph: 833 (off), 598 (resi); Heads of Div -- Grassland Management Div: Dr K C Kanodia; Agro-Silvipasture: Dr P S Pathak; Agril Engg & Post Harvest Tech: Dr Jai Singh; Rural Economics & Biometrics: I P S Yadav; Seed Tech: Dr P S Tomer; Plant Anim Relationship Div: Dr V C Pachauri; Ext & Trg Div: Dr M R Lokhande; Agronomy Div: Dr Menhi Lal; Soil Science Div: Dr R K Tyagi; Plant Improvement Div: Dr S R Gupta; Plant Protection Div: Dr S T Ahmed; Plant Physiology & Biochem Div: Dr R B R Yadava.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Izatnagar 243122; Ph: 74069, Gram: Vetex, Tlx: 577-205 VETEX BE; Estd: 1889; Dir: Dr P N Bhat, Ph: 74069, 74113 (resi).

Objectives: India's oldest research Institute, IVRI has played a vital role since its inception in conducting and guiding research for development of animal husbandry in India. Its primary objectives are: (i) To conduct basic and applied research on all aspects of live-

stock health, production and technology; (ii) To impart postgraduate education, including extension education; (iii) Development of technological know-how and production of veterinary biologicals; (iv) To provide expert advice on veterinary and animal husbandry matters.

Organization: Research, teaching and extension activities of the institute are geared to augment livestock health, production and technology at its three campuses at Izatnagar, Mukteswar and Bangalore, and three Regional Research Stations at Srinagar, Calcutta and Palampur, 20 Research Divisions, three centres, nine sections, a postgraduate faculty and three All India Coordinated Research Projects.

CAMPUSES

Izatnagar: Dir: Dr P N Bhat, Ph: 74069; Jt Dir (Res): Dr B B Mallick, Ph: 76102; Jt Dir (Academic): Dr G C Mohanty, Ph: 74485; Jt Dir (Ext Education): Dr O N Kunzru, Ph: 776181; Scientific Sec to Dir: Dr Satish Kumar, Ph: 74799.

Bangalore: Hebbal; Jt Dir-cum-Station Incharge: Dr B U Rao, Ph: 32509.

Mukteswar: Station Incharge: Dr R P Bansal, Ph: 4135.

REGIONAL RESEARCH STATIONS

Calcutta: Incharge: Dr G P Sen, Ph: 340887.

Palampur: Incharge: Dr Lal Krishna, Ph: 76.

Srinagar: Incharge: Dr D N Dhar, Ph: 75527.

DIVISIONS

Virology (at Mukteswar), Head: Dr M P Yadav, Ph: 4135;

Bacteriology & Mycology, Head: Dr B R Gupta, Ph: 74739;

Biological Products, Head: Dr Y P Nanda, Ph: 74008;

Standardisation, Head: Dr B K Gupta, Ph: 74916;

Pathology, Head: Dr P K R Iyer, Ph: 74096;

Parasitology, Head: Dr N N Sharma, Ph: 73833;

Veterinary Public Health, Head: Dr P N Khanna, Ph: 72965;

Avian Diseases, Head: Dr K C Verma, Ph: 75510;

Epidemiology, Head: Dr S S Khera, Ph: 74659;

Experimental Medicine & Surgery, Head: Dr A K Bhargava, Ph: 74078;

Pharmacology & Toxicology, Head: Dr P K Gupta, Ph: 75291;
 Animal Genetics, Head: Dr R R Mishra, Ph: 74305;
 Animal Nutrition, Head: Dr Kedar Nath, Ph: 74171;
 Animal Reproduction, Head: Dr B R Benjamin, Ph: 75194;
 Laboratory Animal Research, Head: Dr A D Narain, Ph: 75750;
 Physiology & Climatology, Head: Dr B B Mohapatra, Ph: 74327;
 Livestock Products Technology, Head: Dr H B Joshi, Ph: 77036;
 Biochemistry & Food Science, Head: Dr L N Singh, Ph: 74638;
 Livestock Economics & Statistics, Head: Dr Parmatma Singh, Ph: 76820;
 Extension, Head: Dr H P S Arya, Ph: 74391;
 Research Coordination & Monitoring, Head: Dr B C Joshi, Ph: 73567.

CENTRES

Postgraduate Training and Research in Biotechnology, Course-Coordinator: Dr (Mrs) P P Bhat, Ph: 75382;
 National Biotechnology Centre, Incharge: Dr P N Bhat, Ph: 74069;
 National Centre for Research in Meat & Meat Products Technology, Incharge: Dr H B Joshi, Ph: 77036.

SECTIONS

Immunology, Incharge: Dr M P Bansal;
 Education & Training, Incharge: Dr G C Mohanty;
 Livestock Production Research (Cattle & Buffalo), Incharge: Dr L P Nautiyal;
 Livestock Production Research (Pigs), Incharge: Dr Sukh Deo;
 Biophysics & Election Microscopy, Incharge: Dr Satish Kumar;
 Library Science, Incharge: Dr L N Singh;
 Bio-Engineering & Instrumentation, Incharge: G C Joshi;
 Publication & Information, Incharge: P C Tewari;
 Communication Incharge: P Khandekar.

All India Coordinated Research Projects

— Project Coordinator (Anim Breeding): Dr V K Taneja, Ph: 74157.

Project Coordinator (Pigs): Dr R R Mishra;

Project Coordinator (FMD): Dr A K Mukhopadhyay.

Education: MVSc Degree in Bio-technology, Animal Genetics and Breeding,

Animal Nutrition, Animal Physiology, Animal Gynaecology & Obstetrics, Animal Reproduction, Bio-Chemistry, Veterinary Preventive Medicine, Extension Education, Livestock Production & Management, Livestock Products Technology, Poultry Science, Veterinary Virology, Veterinary Bacteriology, Veterinary Medicine, Veterinary Surgery, Veterinary Parasitology, Veterinary Pathology, Veterinary Pharmacology, Veterinary Public Health, Avian Disease, Epidemiology; MSc Degree in Bio-technology, Animal Genetics & Breeding, Animal Physiology, Animal Reproduction, Bio-Chemistry, Food Sciences, Livestock Economics, Management, Livestock Products Technology, Poultry Sc, Microbiology; and PhD Degree in Animal Genetics, Animal Breeding, Animal Reproduction, Animal Nutrition, Animal Physiology, Animal Gynaecology & Obstetrics, Bio-Chemistry, Veterinary Preventive Medicine, Extension Education, Livestock Production Technology, Poultry Science, Veterinary Virology, Veterinary Bacteriology, Microbiology, Veterinary Surgery, Veterinary Medicine, Veterinary Parasitology, Veterinary Pathology, Veterinary Pharmacology. Some more short-term courses will be introduced shortly covering different science subjects. Diploma of Associateship of IVRI are also awarded. Offers National Diploma (9-months course) in Animal Husbandry and Medicine and Surgery (NDAHMS). Also offers short-term courses of one to three months duration in specialized areas like large-scale manufacture and standardization of Tissue Culture Rinderpest (TCRP) Vaccine, large scale manufacture and standardization of tissue culture sheep pox vaccine, Diagnosis of rinderpest, Epidemiology and control of animal diseases, Orthopaedic surgery and radiology, Diagnosis of avian diseases, Management of cattle, Cell culture in suspension and FMD vaccine production technology, veterinary public health and Food hygiene animal cell culture technology, Diagnosis antigens standardization of biologicals, etc. Workshop and other training programmes of short and longterm duration.

Foreign Collaboration: UNDP Projects:

- (i) Centre for Postgraduate education and research in Immunobiotechnology;
- (ii) High Security Animal Disease Laboratory;
- (iii) Technical Cooperation

among developing countries for strengthening the regional network of buffalo development centres in Asia. USAID Projects: (i) Studies on Embryo Transfer Technology and Bio-Engineering; (ii) Intracellular Blood Protista with particular reference to Immunoprophylaxis.

Research — Avian Diseases: Egg-drop syndrome and associated conditions in poultry. Infectious Bursal Disease. Prevalance of indigenous virus strains and studies on prophylactic value of indigenous strains. Immunodiagnosis and differential diagnosis of virus induced sarcomatous tumors in chickens. Reo virus infection. Stunted chicks (mal-absorption) syndrome and associated conditions. Studies on viral diseases of ducks with special emphasis on Duck Hepatitis virus (DHV). Bacteriology and Mycology: Studies on the improvement of existing vaccines against clostridial infections in sheep and goats. Studies on animal mycoplasma and development of vaccine against caprine mycoplasma infections. Large scale production and evaluation of newly developed enterotoxaemia vaccine. Studies on serological identification and characterization of salmonella organisms and their antimicrobial drug resistance. Development of a serodiagnostic test for leptospirosis and to investigate the seroprevalence of leptospira infections in animals. Biological Products: Qualitative and quantitative studies on the Tissue Culture Rinderpest vaccine including application of micro carrier culture technique. Production and standardization of rabies vaccine in BHK-21 cell culture. Studies on adaptation of Flury IEP and CVS strains of rabies virus in CEF monolayers and established cell lines. Evaluation of attenuated sheep pox virus strain. Studies on cell culture Ranikhet disease (R2 B strain) vaccine. Studies on large scale production and standardization of Mallein PPD. Biological Standardization: Establishment of type culture collection. Studies on shelf life of freeze dried egg adapted fowl pox vaccine. Development of National reference standard for veterinary biologicals. (i) Preparation and standardization of reference standard for *Clostridium perfringens* type D. antitoxin; (ii) Preparation and stand-

ardization of reference standard for antirabic vaccine.

Centre for Animal Disease Research and Diagnosis: Monitoring and surveillance of selected important animal diseases. Epidemiology: Monitoring and surveillance of important epizootic and other diseases of livestock: Evaluation of the progress of epizootic disease control in India. Studies on the epidemiological aspects of sheep pox and goat pox in organised farms in India. Studies on mortality and morbidity in bovines and their effect on production under rural conditions. Experimental Medicine: Clinico therapeutic, managerial and preventive studies on production diseases of buffaloes and cattle. Studies on comparative system of medicine in veterinary practice. Experimental Surgery: Experimental and clinical studies for vascular shunt in the treatment of hemodynamic disorders. A comparative study on the osteo-inductive property, healing process and antigenicity of different types of bone graft. Immunology Section: Bio-Chemical and immuno-modulatory properties of interleukin-2 (IL-2) and transfer factor in economically important viral infections of domestic animals. Parasitology: Studies on the control of ticks infecting livestock and poultry. Studies on hydatid disease in domestic animals. Studies on the epidemiology, immunology and control of common liver fluke infection *Fasciola gigantica*. Immunodiagnosis and immunoprophylaxis of anaplasmosis. Studies of *Babesia* sp. in relation to in vitro cultivation, immunoprophylaxis, biochemical parameters and molecular biology in relation to zoonotic importance. Hemoprotozoology with special reference to immunodiagnosis and prophylaxis of theileriasis. Field trials with theileria vaccine for control of bovine theileriasis (*T. annulata*). Studies on some aspects of *Trypanosoma avansi* infection in animals. Studies on the host-parasite relationship, immunology and control of paramphistomiasis in livestock. Pathology: Studies on pathological conditions affecting serosa of Indian buffaloes (*Bubalus bubalis*). Experimental systemic mycosis in young ruminants. Organisation and development of Registry of Pathology and Oncology. Studies on the pathology of nervous system of sheep.

Pharmacology and Toxicology: Investigation on natural plant products as medicinal agents. Pharmacological and toxicological investigations of agrochemicals. Studies on natural and synthetic chemotherapeutic agents for their use in veterinary practice. Studies on the teratogenic effect of plant toxins from Suba bool (*L leuceaphoia*). Veterinary Public Health: Studies on the ameliorative measures in atherosclerosis. Effect of curd feeding on lipoprotein fractions of blood plasma. Studies on the prevalence of zoonotic diseases. Development of rapid diagnostic techniques for demonstration of rapid diagnostic techniques for demonstration of enteropathogen in food, diarrhoeal stool and vomitus. In vitro and in vivo studies on the sensitivity of *Brucella* organisms to newer antibiotics. Virology: Immunological studies with rinderpest virus. Epidemiological and immunogenic studies on bovine herpes virus-1. Studies on goat pox with special reference to development of a vaccine and differential diagnosis. Animal Genetics: Studies on genetics of gametes of farm animals with special reference to cattle and buffaloes. Coordinated studies on blood groups and other marker genes in Indian goat and sheep breeds. Methodology for estimation of draught animal power and genetics of draughtability in Haryana and Haryana cross-bred bullocks. Studies on performance of Indian buffaloes. Genetic studies on exotic cattle raised under different agro climatic conditions of India. Coordinated project on blood groups in cattle and buffaloes. Study of genetic parameters in Angora rabbits. Genetic studies on the dimensions of erythrocytes of mice.

Centre for Advance Studies in Population Genetics: Evaluation of selection to long-term response with laboratory animals. Studies on genetic conservation and evaluation of Nicobari bird (*Glabes* sp) of Andaman and Nicobar Islands. Animal Nutrition: Improvement of poor quality roughages using chemical and microbiological methods. Enzymatic profile in rumen liquor of animal fed different rations. Evolving economic pig ration using conventional and non-conventional feed ingredients. Studies on energy metabolism in ruminants —

Energy balance in cattle and buffaloes. Studies on different levels of calcium feeding for optimum health and production. Nutritional studies on growth and meat production potentiality of buffaloes (*Bubalus Buballs*). Studies on protein and energy requirement. Microbiological treatment of animal wastes and agricultural by-products for livestock production. Effect of ammonium sulphate and urea as non-protein nitrogen source on rumen metabolism and blood metabolic profiles. Use of Mahua (*Bassla latifolia*) seed cake in the feeding of cattle and buffaloes. Nutritive value of neem seed (kernel) cake. Processing and utilisation of digested slurry from gobar gas plant as a source of protein in livestock rations. Studies with zinc in the improvement of NPN utilisation, carbohydrate metabolism and protein synthesis in cattle. Studies on the utilization of carotenes in ruminants.

Animal Reproduction: Comparative studies on artificial insemination of farm animal with special reference to cryopreservation of germ plasm. Studies on molecular interactions causing membrane denaturation in buffalo spermatozoa during deep freezing. Early pregnancy factor in cows and buffaloes. Studies on incidence of retention of placenta in buffaloes.

Animal Physiology and Climatology: Investigation on physiological factors responsible for differences in the heat tolerance in different breed crosses. Spermatogenesis and sperm maturation in goat. Isolation, purification and evaluation of buffalo follicle stimulating hormone. Efficiency of energy utilization in growing cattle. Livestock Production Research (Cattle & Buffalo): Dairy cattle cross breeding in tropics. Genetic and economic evaluation of two and three breed crosses. Studies on pre and post partum body weight changes and their association with production and reproduction. Genetic studies on the milk-ability of cross bred Holstein Friesian cows. Establishment of various managerial norms for crossbred cattle. Studies on the animal behaviour in relation to productivity in crossbred cattle. Studies on oestrus behaviour in relation to fertility in crossbred cattle. Genetic studies on body weight and measurement of crossbred cattle. Evaluation of

various crossbred grades under challenge feeding. Development of a bullock operated dung cleaner. Livestock Production Research (Pigs): Study on the performance of crossbred pigs. To study the performance of indigenous pigs under optimum managerial conditions. (A) Age at weaning and its effect on swine productivity. (B) Studies on lifetime productivity in swine. Livestock Production Research: Mukteswar Kumaon: Studies on cattle production under temperate climatic conditions of Mukteswar. Skin follicular studies in Indian goats. Study of certain phenotypic and genetic parameters of production, growth and prevalence of disease in guinea-pigs. Improvement of goats for Pashmina production. Livestock Production Management: Establishment of various managerial norms for rearing goats (Jamunapari and Barberi). Recycling of Animal Organic Wastes Section: Utilization of organic wastes for fish production. PL-480 Project: Genetics of disease resistance (Lymphoid leucosis). Bio-chemistry and Food Science: Studies on biochemical constituents in relation to animal productivity. Studies on molecular properties and biosynthesis of proteins in domestic animals. Metabolic studies on leucocyte proteins. Studies on certain enzymes of lymphocytes in domestic animals. Role of hydrolases in membrane destabilization. Studies on membrane bound enzymes and proteins in mammalian spermatozoa. Livestock Economics and Statistics: Estimation of economic losses in livestock with special reference to diseases. Studies on model building taking various aspects of diseases. Studies on production and marketing of livestock products and by-products. A micro and macro level perspective. Robustness to non-normality in random models with applications in animal breeding. Effectiveness of vaccine in bovines under village conditions. Effectiveness of artificial insemination in bovines under field conditions. Extension: A study of the factors affecting the adoption of some animal husbandry practices, i.e. (i) Artificial insemination; (ii) Green fodder production; (iii) H S Vaccination. A study of leadership pattern in relation to animal husbandry practices. A study of communication behaviour of livestock owners in

relation to some animal husbandry practices. Study of training needs of livestock owners in the extension area of IVRI. Study of management attributes of livestock owners as related to milk production of dairy cows and buffaloes. Study of some academic aspects of Deemed University of IVRI. An analysis of content and coverage of animal husbandry information through mass media, its area specificity and rural orientation. Impact of development communication of livestock owners in relation to livestock improvement. Operation Research Project -- (a) Animal health coverage programme. (b) Livestock and fodder improvement programme. (c) Stepping up of production of major fodder and food crops. Lab to land programme: Transfer of major fodder and food crops improvement technologies to small marginal and landless farm families. Livestock Products Technology: Effect of breed, sex, age and conformation on the meat characteristics of market slaughtered goats. Studies on carcass and meat characteristics. Observational studies on primary cuts of buffalo/cattle carcasses in India. Studies on processing and preservation of hot processed and comminuted meat and meat products. Studies on recovery of non-stressed and sub-lethally stressed micro organisms from fresh frozen and heat treated meats. Preparation of gelatin from bones. Studies on the preparation and shelf-life of Dahi from the milk of crossbred cattle. Studies on electrophoretic patterns of meat proteins during cooking and storage. MIC Projects: Short and Long Term Residual Effects of Methyl Isocyanate Gas (MIC) Poisoning in Livestock Survivors of Bhopal Episode: Patho-biochemical and hematological alterations occurring in survivors. Study on general health status of surviving livestock exposed to MIC gas at Bhopal. Evaluation of meat and milk quality of samples from MIC affected animals of Bhopal. Monitoring of residues of MIC and its metabolites in various systems of animals survivors. Metabolic profiles of goats suffering from MIC gas exposure. Biotechnology: Establishment of recombinant DNA technology centre for research in vaccine production and improvement of animal production. Studies on molecular cloning in clostridial species for vaccine production. Studies on superovula-

tion non-surgical collection and cryo-preservation of embryos in cattle. Qualitative and quantitative evaluation of uterine, luminal protein activity in buffaloes. Development of monoclonal antibodies and their applications. Development of monoclonal antibodies and their use in study of viruses. Oocyte culture in vitro fertilization and ova culture in livestock. Immunobiology of avian tumors. Electron Microscopy, Biophysics and Instrumentation: Light and electron microscope studies of salmonella enterotoxin pathogenesis. Development of low cost instruments. Antigenic peptides-synthesis and Bio-physical studies.

Centre for Wildlife Conservation, Management and Disease Surveillance: Studies on breeding, nutrition and disease problems in some species of cervides vis-a-vis their perspective conservation in free and captive environment. Studies on the management of cheetah pheasants (*Cat-reus wallichii*) in captivity under tropical and temperate environment. Studies on disease surveillance and health monitoring in captive and free wild life. Director's Laboratory: Advanced statistical techniques in animal genetics researches. Dairy cattle cross breeding in tropics: genetics evaluation of four breed crosses. Genetic studies on Holstein x Haryana and their reciprocal crosses. Joint Director (Research) Laboratory: Field use of non-specific stimulator of immunity (NSI) to prevent the spread of viral disease (goat pox).

Regional Station, Mukteswar 263138, Dist Nainital; Ph: 4135 (Nainital); Sr Scientist & Incharge: Dr R P Bansal; Ph: 25, 26 & 28 (Almora).

NABARD BANKERS INSTITUTE FOR RURAL DEVELOPMENT, 34/5 Park Rd, Lucknow 226001; Ph: 35801, 43620, 33456, 34503; Principal: S S Bhatnagar.

NARENDRA DEV UNIVERSITY OF AGRICULTURE & TECHNOLOGY, PO Kumarganj 224229, Narenda Nagar, Dist Faizabad; Ph: 850, Gram: Agriversity; Vice-Chancellor & Dean: Dr Kirti Singh. Education: Dept of Anim Sc, Prof & Head: Dr K Q Husain. Extension: Dte of Ext, Dir: Dr R P Singh.

R B S COLLEGE, Bichpuri 283105, Agra; Ph: 75244, Gram: College; Estd: 1885; Principal: Dr Roshan Singh. Dept of AH & Dairying, Head: Dr J P Agrawal.

U P COLLEGE, Varanasi. Principal: Dr O P S

Sengar; AH & Dairying Dept, Head: Dr G S Singh. Education: Graduate and post-graduate courses.

West Bengal

BIDHAN CHANDRA KRISHI VISWA VIDYALAYA, Haringhatta, PO Mohanpur 741246, Dist Nadia; Ph: Kalyani 352, Gram: Krishi Bidhan; Estd: 1974; Vice-Chancellor: Dilip Kumar Das Gupta.

Faculty of Veterinary & Animal Sciences: Dean: Dr R Sinha; Departments — Anim Breeding, Head: Dr Rahul Sinha; Anim Production & Mgmt, Head: Dr S C Majumder; Anim Nutrition, Head: Dr S Biswas; Dairy Tech, Head: Dr R K Kuila. Education: BSc (Dairy Tech), BVSc & AH, MSc and PhD in Dairy Sc/Technology/Husbandry/Cattle Breeding/Nutrition/Chemistry/Bacteriology/Cattle Production and Management. Extension: Booklets for farmers.

Dairy Science College: See "Faculty of Veterinary & Animal Sciences, Bidhan Chandra Krishi Viswa Vidyalaya."

GRAMSEVAK TRAINING CENTRE, Ramakrishna Mission Ashrama, PO Narendrapur 743508, Dist South 24-Parganas; Principal: Mrs Shanti S Chakraborty.

INDIAN INSTITUTE OF TECHNOLOGY, Kharagpur 721302; Ph: 221-224, Gram: Technology, Tlx: 021-2760 IITKG IN; Dir: Prof G S Sanyal; Agril Engg Dept, Head: Dr T Satyanarayana; Scientists Incharge — Dairy Engg: Prof H Das, Dr A K Datta, Dr P K Chandra; Dairy Tech: Dr Sitaram Prasad. Education: Dairy Engineering offered as part of BTech (Hons) and MTech in Agril Engg. Provided facilities for PhD in Dairy Engineering and Technology.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Regional Research Station, c/o Dept of Vet/Public Health, All India Inst of Hygiene & Public Health, 110 Chittaranjan Avenue, Calcutta 700073; Ph: 323504; Incharge: Dr G P Sen, Ph: 373107 (resi). Research: Studies on association of zoonotic infections in human pyrexial cases. Studies on human diarrhoeal diseases with reference to zoonotic infections in and around Calcutta. Monitoring and surveillance of selected important animal diseases.

INSERVICE TRAINING INSTITUTE OF VETERINARY,
Dte of Vet Services, Govt of West Bengal,
37 Belgachia Rd, Calcutta 700037.

NABARD REGIONAL TRAINING CENTRE, Bolpur
Lodge, Bolpur 731204; Principal: N S
Karekar.

NATIONAL DAIRY DEVELOPMENT BOARD (NDDB),
Eastern Regional Demonstration and Train-
ing Centre, (RD & TC), PO Matigara, Sili-
guri 734428; Ph: 23408, Gram: Dairyboard;
Principal: Dr B K Patnaik. Training Prog-
rammes: Artificial insemination & vet
first aid; Frozen semen handling for lay-
inseminators; Milk Procurement & Input,
In-service training for Extn Assts;
Orientation programme for secretaries and
village women in modern scientific and
AH practices.

NATIONAL DAIRY RESEARCH INSTITUTE, Eastern
Regional Station, Kalyani 741235, Dist
Nadia; Ph: 264, Gram: Dairysearch; Head:
Dr S B Basu. Scientists Incharge -- Anim
Breeding & Genetics: Dr S B Basu; Soil,
Fertilizers, Agronomy Lab: Dr T K Ganguly;
Anim Nutrition & Bio-Chemistry Lab: R C
Saha; SRC: J Chattaraj; AI: M M Kale;
ORP: Dr P K Roy; Farm: Dr R B Singh.
Education: Offers PhD course in Anim
Breeding & Genetics. Extension: Services:
Vaccination, disease diagnosis, AI, farm
visits, advisory services, etc.

SEVA BHARATI KRISHI VIGYAN KENDRA, PO Kap-
gari 721505, Dist Midnapore; Ph: Jhar-
gram Ex, Kapgari Extn: 1, Gram: Seva-
Bharati; Head: Manomohan Ray. Education:
Teaching courses for farmers, school
dropouts, educated unemployed youth
trainees. Services: Farm visits, Theori-
tical & practical demonstration programme
for beneficiaries according to their need
and help regarding their animals and
birds diseases, diagnosis, vaccination,
treatment. Training: One day motivational
trg (Off-campus); One week off-campus
practical trg (as per requirements of
beneficiaries); Short trg in poultry mgmt
(20 days); Short trg in dairy mgmt (30
days); Short trg in Duckary (10 days);
Short trg in Dairy, goat & sheep rearing
(15 days); No fee.

STATE INSTITUTE OF ANIMAL HUSBANDRY & DAIRY-
ING, Govt of West Bengal, Mohanpur 741246.
Education: Indian Dairy Diploma (Dairy
Husbandry); Offr-in-Charge: J Nag.

VETERINARY TRAINING INSTITUTE FOR VFAs, Dte
of Vet Services, Govt of WB, PO Midnapore
721101; Ph: 726; Principal: Dr S K Chakra-
borty. Inservice trg for one year for the
vet field assistants.

Late Additions

BIHAR

SANJAY GANDHI INSTITUTE OF DAIRY TECHNOLOGY,
Dhelwan, Lohianagar, Patna 800020; Ph:
22880; Assoc Dean-cum-Dir: Dr R S Singh;
Head of Depts -- Dairy Tech: Dr Sitaram
Prasad; Dairy Engineering: M D Singh;
Dairy Chemistry: Dr C P Singh; Dairy
Microbiology: Dr S K Tomar; Dairy Eco-
nomics & Mgmt: Dr R K P Singh; Dairy
Extn: A K Thakur; Cattle Production &
Nutrition: Dr Chandramoni. Education:
Offers BSc course in Dairy Technology.

DELHI

INDIAN INSTITUTE OF BIOTECHNOLOGY, c/o Tata
Energy Research Institute, 90 Jor Bagh,
New Delhi 110003; Ph: 693923.
NATIONAL INSTITUTE OF IMMUNOLOGY, Jawaharlal
Nehru Univ Complex, Shahid Jeet Singh
Marg, New Delhi 110067; Ph: 661476, 662608,
650980, 654360, Gram: Immunology, Tlx:
031-66183 NII IN; Dir: Prof G P Talwar.
Laboratories (Offrs Incharge): Embryo
Biotechnology (Gurpreet Singh & Dr S M
Totey); Hybridoma (Dr S K Gupta); DNA
(Dr P S Khandekar); Protein Chemistry
(Dr Manas Choudhary); RIA (Dr Om Singh);
Microbiology (Dr Rama Mukherjee); Toxi-
cology (Dr N C Sharma); Sperm Biotechno-
logy (Dr Chandrima Saha); Electron Micro-
scopy (Dr Shakti Upadhyay); Zona (Dr Thil-
lekootan). Research Projects: Superovu-
lation, non surgical recovery and trans-
fer in cattle; In vitro, maturation of
oocyte, sperm capacitation in vitro ferti-
lization in cows and buffaloes; Cloning
of FSH and other pituitaries for super-
ovulation; Freezing of embryos; Micro
manipulation of embryos; Sexing of Embryos;
Early detection of pregnancies in cow and
buffalo. Achievements: Project on embryo
transfer was started in April 1986 and
the first successful embryo transfer was
carried out in India by Dr S M Totey and
Gurpreet Singh. A 29 kg female calf was
born on January 13, 1987. New sensitive
and specific immunodiagnostic tests for
animal brucellosis, leptospirosis and
campylobacteriosis have been developed
that can be employed under field condi-
tions. Monoclonal antibodies against
Rabies virus have been produced and a
simple field based dipstick enzyme

immunoassay test has been developed to monitor the specific antibody response in animals and man injected with rabies vaccine.

GUJARAT

BAIF RURAL INSTITUTE FOR SOCIO-ECONOMIC RECONSTRUCTION, Dantainagar Society, At & PO Kadod 394335, Tal Bardoli, Dist Surat; Ph: 94; Campus Dev Offr: P B Patel.

KARNATAKA

CARTMAN (Centre For Action, Research & Technology For Man, Animal And Nature), 870, 17th Main, Koramangala VI Block, Bangalore 560034; Ph: 563121, Gram: Cartman; President: Prof N S Ramaswamy, Ph (resi): 573304.

MADHYA PRADESH

INDIRA GANDHI KRISHI VISHWA VIDYALAYA, Raipur Campus, Labhandi, Raipur 492012; Ph: 24615, 24608; Vice Chancellor (Officiating): Dr S S Baghel.

College of Dairy Technology, Labhandi, Raipur 492012; Ph: 24608; Assoc Prof, Dairy Engineering Div: V Johri; Assoc Prof, Dairy Economics: S K Sharma. Education: Offers BSc course in Dairy Technology.

KASTURBAGRAM KRISHI KSHETRA, Kasturba Gandhi National Memorial Trust, Kasturbagram, Indore 452020; Ph: 63148, Gram: Kasturbagram; Dir: T G K Menon; Mgr: R S Patel, Ph (resi): 60265.

UTTAR PRADESH

GOVERNMENT POLYTECHNIC, Near Deep Cinema, DCF Cold Storage Campus, Etawah 206001; Ph: 701; Principal: K L Wadhwa. Education: 3-year diploma course in Dairy Engineering.

MILITARY FARMS SCHOOL AND RESEARCH CENTRE (MFS & RC), Grass Farm Rd, Meerut Cantt 250001; Estd: 1920; Ph: 77041 ext 330, Gram: Military Farms School; Commandant: Dr Har Kishan Singh; Dairy & Agricultural Chemist: Dr T D Pruthi; ARO: Dr Dhum Singh; Fodder Specialist: Maj (Dr) Ranvir Singh; Cattle Husbandry Offr: Vacant; Agricultural Engg, AAE: B B Saxena. Functions: Imparting training to Military Farms personnel; providing analytical service to Military Farms; Standardizing milk testing equipment, appliances and chemicals; conducting scientific trials

and applied research; disseminating knowledge concerning the profession through publications; keeping liaison with research institutes and agricultural universities/allied departments; and organising exhibitions. Courses — Elementary: For Sub-assistant supervisors of 90 days duration; Intermediate: for Assistant supervisors of 90 days duration; Advance Administrative: for Supervisors of 90 days duration; Accounts: for Clerical cadre; Refresher course of 45 days duration; Short course on fodder production for officers of HV Corps; Orientation course for test audit officers.

AN ESSENTIAL COMPANION

The Yearbook can be useful to you in many ways: as a source of stimulation and guidance for fresh directions and ideas; as a ready reference in the preparation of feasibility reports, proposals, papers, speeches or teaching; to give the excitement of current developments to students, extension workers, planners, entrepreneurs, newcomers and the like; and, lastly, as a means of attracting new creative talents to advance the frontier of knowledge. To those in the industry, the Yearbook is an information "bank" to products and services — a veritable who's who and what's what of the industry.

YOUR ATTENTION PLEASE!

If you have an entry in the YEARBOOK, you may suggest the names of individuals/organizations who do not at present appear but whom you consider worthy to be included in the Yearbook.

Please send us a postcard with names and addresses of any suitable persons/organizations to whom we will be glad to send a data form.

DAIRY INDIA YEARBOOK

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There is an urgent need to make a special review of the food laws and take measures for protecting the consumers and ensure availability of safe and wholesome foods.

P.F.A. Sampling Procedures: A Review

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THE Prevention of Food Adulteration (PFA) Act has been enacted to provide wholesome and hygienic or safe foods to consumers and to prevent adulteration in various food articles. To achieve these objectives, various provisions of the Act empower different authorities/agencies for prescribing standards for various foods and procedures for its implementation. The Act has twice undergone major amendments -- once in 1964 and the second time in 1976 for providing deterrent penalty. But even with such a stringent punishment as life imprisonment, the objectives do not appear to have been achieved. On the contrary, consumers continue to raise hue and cry against the sale of adulterated, injurious and hazardous food articles, while the food trade and industry complains about the unnecessary harassment at the hands of implementing agencies. One should examine the various causes for this situation and suggest steps to rectify the shortcomings.

The definition of 'adulteration' as laid down under the Act is so wide that even genuine agricultural food articles falling below the quality of standards prescribed are considered to be adulterated and are treated at par with wilful adulteration of injurious or hazardous nature. It is a well-known fact that quality of agricultural products varies according to type of seeds, fertilisers used, irrigation facilities available and above all the agro-climatic factors. Further, it has also been observed that due to droughts, floods and other

natural calamities, oilseeds do not mature properly and hence the oil extracted out of such oilseeds cannot conform to the characteristics laid down under PFA Rules. In such cases, no toxicity is observed, but the oil dealers are subjected to heavy penalty of imprisonment and fine.

The law protects producers of the "primary foods" such as oilseeds, foodgrains, etc if their products do not conform to the prescribed standards on account of natural causes, but no such protection has been extended to processors who may use such sub-standard raw agricultural commodities.

It may not be desirable that the sale of sub-standard foods, even though non-toxic and non-injurious, be permitted under the law. At the same time, can it be justified that the processors of such foods, be subjected to severe penalty? It is, therefore, desirable that the law should be so amended that such agricultural products which are non-toxic and do not conform to the standards on account of natural calamities, and where no human agency is involved may attract a lesser punishment. The discretion should vest in the courts in all such cases of economic offences.

Storage Simplification: It is a well-known fact that hoteliers and restaurant owners purchase raw materials like atta, maida, suji, spices, etc and store them for preparation of various recipes. One such example is storage of milk and curd. It is

a common practice that to prepare good coffee and tea, milk has to be diluted. In such cases, the food inspector insists on drawing sample of diluted milk and forces the vagaries of law on the hoteliers. This difficulty and consequent harassment was admitted by the Joint Select Committee of Parliament in its report of 1976 and had suggested that in order to obviate these difficulties which are equally faced by hotels in public sectors, the Government may issue directions provided for under section 22A of the Act. But no such directions have so far been issued. The Joint Select Committee accepted, in principle that the storage simplicitor should not be considered as an offence, but the Government in its enthusiasm introduced an explanation to Section 7 of the PFA Act which states that "a person shall be deemed to store any adulterated food or misbranded food...if he stores such food for the manufacture therefrom of any article of food for sale." This is contrary to the recommendations of the Joint Select Committee and hence needs immediate attention and action by the Government.

Definition of "Adulterant": The possession of an adulterant is an offence under the law. What is an adulterant—any material which is or could be employed for the purpose of adulteration. It is a well-known fact that in the dairy industry, water is freely used for washing the implements and machinery, but water can also be used as adulterant for milk; thus a food inspector bent upon harassing the genuine trade can prosecute the genuine dairy dealers for possessing water in his premises.

Division of Sample: Take note of another clause whereby the earlier procedure of providing a part of the sample to the vendor has been deleted. This change has been effected so that the vendor and the public analyst or food inspector do not form any collusion and change the sample to be sent to Central Food Laboratory. What is happening at present?

The Local (Health) Authorities accompany the food inspector and thus become a party to the sampling—indirectly forming a collusion and defeating the very purpose of appointing an independent authority at a senior level. The Drugs and Cosmetic Act provides for drawing of four samples where one sample is given to the vendor. Hence,

the same principle should be applied here under PFA as well.

Finality of Central Food Laboratory Reports:

The Annual Reports of the Directorate-General of Health Services have indicated that there is a variation of 20 to 50 per cent in the analysis of samples between the State Laboratory and the Central Food Laboratory. Why is it so? This needs to be probed into. It has been explained on a number of occasions that the Central Food Laboratories possess better technical staff and sophisticated equipment and hence its reports should be considered as final. If that principle is accepted, then there should not have been any variation in the results of foods issued by Pune laboratory which acts as a Public Analyst and also as a Central Food Laboratory. If a State Laboratory can commit bonafide mistakes in the analysis, there is every reason that the same persons working as chemists in the Central Food Laboratory can commit similar bonafide mistakes. In all fairness, it is, therefore, desirable that the two reports should be given equal status in the eyes of the law and the Courts, on the basis of evidence adduced before it, should come to its own conclusions in respect of correctness of an analysis. Even in the UK, where duplicate samples are sent to government chemist, the two reports are given equal weightage in the eyes of law. There is no country where such a finality is given to a report by a food laboratory.

Methods of Sampling and Standards: While the PFA law provides for the general procedure of dividing a sample into three different portions, method of sealing, fastening and despatch etc, it does not provide detailed procedures for drawing samples of different commodities. In the absence of proper guidelines, many of the food inspectors do not know the correct techniques of drawing samples of heterogeneous commodities like tea, asafoetida, spices, grains etc, from bulk containers—may be a bag of flour of 100 kg or a drum or a tanker of oil containing tonnes of material in it.

It is a well-known fact that fat in milk separates to the top on standing. So, if a sample is drawn from top layer, then it will be deficient in SNF (solids-not-fat), but if it is drawn from the bottom

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Standards

ANIMAL FEEDS

Feeds and feedingstuffs, methods of test for: General methods (IS: 7874 (Part I)-1975); Minerals and trace elements (IS: 7874 (Part II)-1975); Microbiological methods (IS: 7874 (Part III)-1975)

Blood meal (IS: 7060-1973)

Bone meal (IS: 1942-1968, first revision); calcined (IS: 7061-1973)

Coconut oilcake -- Expeller pressed (IS: 2154-1986, second revision); solvent extracted (IS: 3591-1985, first revision)

Common salt and cattle licks (IS: 920-1972, first revision)

Compounded feeds -- for cattle (IS: 2052-1979, third revision); for young stock (IS: 5560-1970)

Cottonseed oilcakes -- Expeller pressed (IS: 1712-1982, second revision); solvent extracted (IS: 3592-1985, second revision)

Dicalcium phosphate, animal feed grade (IS: 5470-1969)

Fish meal (IS: 4307-1983, second revision)

Fodder yeast (IS: 3198-1965)

Gram -- Chuni (IS: 3161-1965); husk (IS: 3162-1965)

Groundnut oilcake -- Decorticated (IS: 1713-1986, second revision); solvent extracted (IS: 3441-1982, first revision)

Guar meal (IS: 4193-1967)

Linseed oilcake -- Expeller pressed (IS: 1935-1982, first revision); solvent extracted (IS: 3440-1985, first revision)

Maize -- bran (IS: 2153-1985, first revision); germ oilcake (IS: 2151-1985, first revision); gluten feed (IS: 2152-1972, first revision)

Meat meal and meat-cum-bone meal (IS: 5065-1969)

Mineral mixture for supplementing cattle feed (IS: 1664-1981, second revision)

Mustard and rapeseed oilcake (IS: 1932-1986, second revision)

Nigerseed oilcake, solvent extracted (IS: 5862-1970)

Rice bran (IS: 3648-1975, first revision);

solvent extracted (IS: 3593-1979, second revision); bran parboiled as feed ingredient (IS: 9867-1981)

Rice polish (IS: 3163-1965)

Rubber seed cake, feed ingredient (IS: 9599-1980)

Safflower (kardi) oilcake -- decorticated (IS: 2503-1963); solvent extracted (IS: 6442-1985, first revision)

Sal seed meal, solvent extracted (IS: 7059-1973)

Sesamum (til) oilcake (IS: 1934-1982, first revision)

Silk worm pupae, dried (as livestock feed) (IS: 6107-1971)

Tapioca -- (IS: 1509-1972, first revision); Spent pulp (IS: 5064-1980, first revision)

Tur -- chunni (IS: 3160-1965); husk (IS: 5063-1969)

Wheat bran (IS: 2239-1971, first revision)

CATTLE HOUSING AND EQUIPMENT

Artificial insemination -- equipment, code for cleaning and sterilization of (IS: 8103-1976)

-- gloves, disposable (IS: 7180-1973)

-- pipettes, -- disposable plastic (IS: 7179-1973); glass (IS: 6543-1972)

Chaff cutter -- manually operated (IS: 7898-1981, first revision); blades for (IS: 1511-1979, second revision); test code for (IS: 7897-1975)

Housing farms -- for arid areas, recommendations for: shed for average farmer (IS: 8845 (Part I)-1978, for rural milk producer (IS: 8845 (Part II)-1978); shed for gaushala and other organized milk producer (IS: 8845 (Part III)-1978)

-- for heavy rainfall and highly humidity areas, recommendations for: shed for an average farmer (IS: 5605 (Part I)-1970); for rural milk producer (IS: 5605 (Part II)-1970); shed for gaushala and other organized milk producer (IS: 5605 (Part III)-1970)

-- large dairy farms, for (IS: 6027-1970)

-- for plain areas with medium rainfall, recommendations for: shed for an average farmer (IS: 4466 (Part I)-1967); for a

- rural milk producer (IS: 4466 (Part II) -1968); shed for gaushala and other organized milk producer (IS: 4466 (Part III)-1968)
- Milking shed, community - recommendations for (IS: 5284-1969)
- Semen of breeding bulls, recommendations for handling and transport of (IS: 8102-1976)
- Transport of livestock, code for: transport of cattle by rail and road (IS: 4157 (Part II)-1983, first revision); transport of sheep and goats by rail and road (IS: 4157 (Part III)-1983, first revision)

DAIRY EQUIPMENTS

- Batch pasteurizers -- stainless steel (IS: 2689-1964)
- Borers for drawing samples of milk powder and smaller products (IS: 11634-1986)
- Bottle washer (hand operated) (IS: 2144-1962)
- Bottles -- for sterilized milk (IS: 5567-1970, of glass for milk (IS: 1392-1983, third revision)
- Butter -- scotch-hand (IS: 2499-1978, first revision)
- Can washer, milk -- manually operated (IS: 2342-1963)
- Can washing trough (IS: 2343-1963)
- Cans, milk -- aluminium (IS: 1825-1983, second revision); tinned mild steel (IS: 1373-1981, third revision)
- Cap sealer for milk bottles, hand operated (IS: 2146-1962)
- Cheese -- hoops (IS: 2495-1963)
- knife (IS: 2498-1963)
- mill (IS: 2647-1964)
- press, hand operated (vertical) (IS: 2504-1964)
- Cooling tanks, farm milk--(IS: 3661-1966)
- Crates -- for milk bottles (IS: 1613-1960); of high density polyethylene (HDPE) for 500 ml glass milk bottle (IS: 9907-1981); high density polyethylene (HDP) crates for milk sachets (IS: 11584-1986)
- Dairy equipment, guidelines for cleaning and sterilizing (IS: 5253-1969)
- Delivery vans, milk -- code for construction of (IS: 9854-1981)
- Foil for milk bottle caps (aluminium) (IS: 1705-1972, first revision)
- Ghee -- pans, steam jacketed -- stainless steel (IS: 2829-1979, first revision)
- settling tank for -- stainless steel (IS: 4743-1968)
- Ice chambers for 40- and 50- litre milk cans (IS: 2242-1975, first revision)
- Insulated stainless steel silos for milk storage (capacity: 60,000 litres &

- 1,00,000 litres) (IS: 11586 (Part I) -1986)
- Milk -- pipes and fittings, stainless steel (IS: 3382-1965)
- strainers (IS: 1516-1972, first revision)
- Rubber for dairy industry (IS: 6450-1971)
- Storage tank, milk -- insulated stainless steel (IS: 2688-1974); insulated stainless steel (vertical type) (IS: 4938-1969)
- Tankers, milk -- rail (IS: 6591-1972); road, stainless steel (IS: 2492-1976, first revision)
- Trays, milk collection (IS: 9853-1981)
- Trolley, milk can (IS: 6684-1972)
- Vats, milk--stainless steel (IS: 2336-1963)
- Wooden butter scoop (IS: 2497-1963)

DAIRY INDUSTRY LAYOUT PLANS

- Dairy laboratories, layout plan for (IS: 2981-1964)
- Dairy floors (IS: 7956-1975)
- Ghee refinery, recommendations for (IS: 3922-1966)
- Regulated market yards for cattle, layout for (IS: 1788-1961)

DAIRY PRODUCTS

- Burfi (IS: 5550-1970)
- Butter-milk powder, sweet cream (IS: 5163-1969)
- Casein (edible quality) (IS: 1167-1965, revised)
- Chakka and shrikhand (IS: 9532-1980)
- Cheese -- natural, (hard variety), processed, processed spread and soft (IS: 2785-1979, first revision)
- powder (IS: 9584-1980)
- Chhana (IS: 5162-1980, first revision)
- Cream, sterilised (IS: 4884-1968)
- Dahi (IS: 9617-1980)
- Ice cream (IS: 2802-1964)
- cones (IS: 7187-1974)
- mix, dried (IS: 7839-1975)
- Gulabjamun, Packed (IS: 11602-1986)
- Khoa (IS: 4883-1980, first revision)
- Kulfi (IS: 10501-1983)
- Lactose commercial (IS: 1000-1959)
- Milk--condensed (IS: 1166-1986, second revision)
- flavoured (IS: 4709-1968)
- pasteurization, code for (IS: 6397-1971)
- powder (IS: 1165-1986, third revision)
- sterilized (IS: 4238-1967)
- foods, malted (IS: 1806-1975, first revision)
- sterilized (IS: 4238-1967)
- foods, malted (IS: 1806-1975, first revision)

- products, fermented (IS: 7035-1973)
- Paneer (IS: 10484-1983)
- Rasogolla, canned (IS: 4079-1967)

FOOD ADDITIVES

- Acacia (Arabic) gum, food grade (IS: 6795-1972)
- Agar, food grade (IS: 5707-1970)
- Alginic acid, food grade (IS: 7928-1975)
- Amaranth, food grade (IS: 1696-1974, first revision)
- Amylase aspergillus oryzae, food grade (IS: 9605-1980)
- Annatto colour (IS: 2557-1963)
- Ascorbic acid, food grade (IS: 5342-1969)
- Benzoic acid, food grade (IS: 4448-1967)
- Beta-apo-8' -carotenal, food grade (IS: 6386-1971)
- Beta-Carotene (IS: 3841-1966)
- Brilliant blue, FCF, food grade (IS: 6406-1977, first revision)
- Butylated hydroxyanisole, food grade (IS: 5343-1969)
- Calcium alginate, food grade (IS: 7905-1975)
- Calcium propionate, food grade (IS: 6031-1971)
- Calcium saccharin, food grade (IS: 5709-1978, first revision)
- Canthaxanthine, food grade (IS: 6405-1971)
- Caramel — plain (IS: 4467 (Part I)-1980, first revision); ammonia process (IS: 4467 (Part II)-1980, first revision); ammonia sulphite process (IS: 4467 (Part III)-1980, first revision)
- Carmoisine, food grade (IS: 2923-1974, first revision)
- Carob bean gum, food grade (IS: 7237-1974)
- Chlorophyll — Magnesium Complex (IS: 4446 (Part I)-1986); Copper Complex (IS: 4446 (Part II)-1986)
- Coaltar food colour preparations and mixtures (IS: 5346-1975, first revision)
- Common names for coaltar food colours (IS: 5056-1969)
- Dodecyl gallate, food grade (IS: 6794-1972)
- Drinking chocolate (IS: 6762-1972, second revision)
- Erythrosine, food grade (IS: 1697-1974, first revision)
- Ethyl ester of beta-apo-8' -carotenoic acid, food grade (IS: 7260-1974)
- Fast green FCF, food grade (IS: 6022-1977, first revision)
- Fast red E, food grade (IS: 2924-1974, first revision)
- Fumaric acid, food grade (IS: 6793-1972)
- Gelatin, food grade (IS: 5719-1970)
- Green S, food grade (IS: 6029-1977, first revision)

- Gum ghatti, food grade (IS: 7239-1974)
- Indigo carmine, food grade (IS: 1698-1974, first revision)
- L (+)-tartaric acid, food grade (IS: 9504-1980)
- Lecithin, food grade (IS: 5055-1969)
- Methods of sampling and test for food colour (IS: 1699-1974, first revision)
- Methyl ester of beta-apo-8' -carotenoic acid (IS: 6797-1972)
- Monosodium L-glutamate, food grade (IS: 9505-1980)
- Octyl gallate, food grade (IS: 6798-1972)
- Ponceau 4 R, food grade (IS: 2558-1974, first revision)
- Potassium metabisulphite, food grade (IS: 4751-1968)
- Potassium nitrate, food grade (IS: 4753-1968)
- Potassium nitrate, food grade (IS: 5057-1969)
- Propyl gallate, food grade (IS: 6796-1972)
- Reference food colour boxes (IS: 7584-1975)
- Riboflavin (IS: 3827-1966)
- Saccharin, food grade (IS: 6385-1978, first revision)
- Sodium alginate, food grade (IS: 5191-1969)
- Sodium benzoate, food grade (IS: 4447-1967)
- Sodium carboxymethyl cellulose, food grade (IS: 5306-1978, first revision)
- Sodium citrate, food grade (IS: 5058-1969)
- Sodium metabisulphite, food grade (IS: 4752-1968)
- Sodium propionate, food grade (IS: 6030-1971)
- Sodium saccharin, food grade (IS: 5345-1978, first revision)
- Sodium tartrate, food grade (IS: 5708-1970)
- Sorbic acid, food grade (IS: 4818-1968)
- Sorbitol, food grade (IS: 4750-1968)
- Sugar, refined (IS: 1151-1969, first revision)
- Sulphur dioxide, food grade (IS: 7908-1975)
- Sunset yellow FCF, food grade (IS: 1695-1974, first revision)
- Tartarazine, food grade (IS: 1694-1974, first revision)
- Titanium dioxide, food grade (IS: 8356-1977)
- Total dye content in food colour preparations, methods of test for (IS: 6120-1971)
- Tragacanth gum, food grade (IS: 7238-1974)

FOOD HYGIENE

- Ice-cream: manufacture, storage and sales of - code for hygienic conditions (IS: 5839-1970)
- Indigenous milk products, code for hygienic conditions for production, transport, storage and distribution of: khao and

khoea based sweets (IS: 10974 (Part I)-1984); Dahi (IS: 10974 (Part II)-1984); coagulated products, chhana & chhana based sweetmeats (IS: 10974 (Part III)-1984); frozen products: kulfi (IS: 10974 (Part IV)-1984); fermented products: shrikhand (IS: 10974 (Part V)-1984)

Milk: production, processing, transport and distribution of - code for hygienic conditions (IS: 7005-1973).

Sweetmeat shops, code of hygienic conditions for (IS: 7802-1975)

FOOD LABELLING AND ADVERTISING

Food advertising, code of practice for (IS: 7655-1975)

Labelling for prepacked foods, code of practice for: General guidelines, (IS: 7688 (Part I)-1975); Guidelines for claims (IS: 7688 (Part II)-1976); Nutritional labelling (IS: 7688 (Part III)-1976)

INFANT FOODS

Infant formulae (IS: 11156-1985)

Infant milk foods (IS: 1547-1985, second revision)

Milk cereals weaning foods (IS: 1656-1985, second revision)

Processed cereal-based complementary foods for infant (IS: 11536-1985)

Protein-rich food supplements for infants and pre-school children (IS: 7021-1973)

Vegetable protein infant food with milk (IS: 6387-1971)

SENSORY EVALUATION

Butter, table -- method for sensory evaluation of (IS: 7769-1975)

Ghee (clarified butter fat) -- method for sensory evaluation of (IS: 7770-1975)

Glossary of general terms for sensory evaluation of foods -- Methodology (IS: 5126 (Part I)-1969); quality characteristics (IS: 5126 (Part II)-1969)

Guide for sensory evaluation of foods: optimum requirements (IS: 6273 (Part I)-1971); methods and evaluation cards (IS: 6273 (Part II)-1971); statistical analysis of data (IS: 6273 (Part III)-1975)

Guide for selection of panel for sensory evaluation of foods and beverages (IS: 8140-1976)

Guide for testing products of intense flavour (IS: 7997-1976)

Milk, method for sensory evaluation of (IS: 7768-1975)

Milk powders, methods of sensory evaluation of (IS: 11030-1981)

Packing and storage on the sensory qualities of foods and beverages, code for the evaluation of the effect of (IS: 8639-1977)

Processed cheese, methods for sensory evaluation of (IS: 10281-1982)

Sweetened condensed milk, methods for sensory evaluation of (IS: 10029-1981)

SPICES AND CONDIMENTS

Cardamom (IS: 1907-1984, second revision)

Saffron (IS: 5453-1980, first revision)

TESTING APPARATUS

Cylindrical pipettes for bacteriological examination of milk (IS: 2025-1962)

Fat extraction apparatus for milk and milk products (IS: 2311-1973, first revision)

Fat -- in cheese, apparatus for determination of, by Van Gulick method (IS: 9105-1979)

-- in milk, apparatus for determination by Gerber method - Butyrometers and stoppers (IS: 1223 (Part I)-1982, second revision); pipettes and automatic measure (IS: 1223 (Part II)-1972, first revision); centrifuges and water baths (IS: 1223 (Part III)-1977, first revision)

Lactometers (IS: 9585-1980)

Milk testing, mobile kit for (IS: 3864-1966)

Microscopic count of milk -- capillary pipettes for direct (IS: 2803-1964)

-- slides for direct microscopic count (IS: 3893-1966)

TESTING METHODS

Butter, methods of sampling and test for (IS: 3507-1966)

Choline content -- in cheese and processed cheese, method of determination of, by the potentiometric titration method (IS: 11763-1986)

Cream, methods of sampling and test for (IS: 3509-1966)

Fat -- in cheese, method of determination of, by Van Gulick method (IS: 9070-1979) -- in milk, determination of by Gerber-method (IS: 1224 (Part I)-1977, first revision); -- in milk products (IS: 1224 (Part II)-1977, first revision); -- in milk powder and similar products, method for determination of (IS: 11721-1986); -- in condensed milk, method for determination of (Reference Method) (IS: 11762-1986)

Food colours, methods of sampling and test

- for (IS: 1699-1974, first revision)
 Ghee (butter fat), methods of sampling and test for (IS: 3508-1966)
 Lactic acid and lactate content — in milk powder and similar products, method for determination of (IS: 11202-1985)
 Milk recording of cattle, method of (IS: 6692-1972)
 Milk testing — Rapid examination (IS: 1479 (Part I)-1960); chemical analysis (IS: 1479 (Part II)-1961); bacteriological analysis (IS: 1479 (Part III)-1977, first revision); freezing point depression (IS: 1479 (Part IV)-1977, first revision); method of dairy plant control (IS: 1479 (Part V)-1962)
 Moisture — in milk powder and similar products, method for determination of (IS: 11623-1986)
 Nitrate and nitrate content — in cheese, method of determination of, by cadmium reduction and photometry (IS: 9967-1981)
 Phosphatase activity, determination in milk and milk products (IS: 8479-1977) — routine method (IS: 8479 (Part I)-1977); reference method (IS: 8479 (Part II)-1977)
 SNF (solids-not-fat) — in milk, method of test for determination of, by the use of lactometers (IS: 10083-1982)
 Sucrose content — in condensed milk, method of determination of, by polarimetric method (IS: 11764-1986)
 Titratable acidity — in milk powder and similar products, method of determination (Reference method) (IS: 11765-1986); (Routine method) (IS: 11766-1986)
 Total solids content — in condensed milk — method of determination of (IS: 11622-1986).

DAIRY ACCOUNTS

- Accounts, code of practice for keeping (IS: 7607-1975); primary milk collection units (IS: 7607 (Part I)-1975); market milk plants (IS: 7607 (Part II)-1975); product plant (IS: 7607 (Part III)-1975).

Late Additions

FOOD ADDITIVES

- Dicalcium Phosphate, food grade (IS: 9970-1981)
 Glyceryl Monostearate, food grade (IS: 9953-1981)

- Guar gum, food grade (IS: 10502-1983)
 Gum Karaya, Gum Bassora, food grade (Under Printing)
 Isopropyl alcohol, food grade (IS: 11686-1986)
 Lactic acid, food grade (IS: 9971-1981)
 Mineral oil, food grade (IS: 10563-1983)
 Phosphoric acid, food grade (IS: 10508-1983)

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DEFINITIONS OF MILK AND MILK PRODUCTS UNDER THE PREVENTION OF FOOD ADULTERATION (PFA) RULES, 1955

(as amended upto 6th December, 1985)

milk: the normal mammary secretion derived from complete milking of healthy milch animal without either addition thereto or extraction therefrom. It shall be free from colostrum. Milk of different classes and of different designations shall conform to the standards laid down in the table below item A.11.01.11.

--boiled: milk which has been brought to boil.

--double toned: the product prepared by admixture of cow or buffalo milk or both with fresh skimmed milk, or by admixture of cow or buffalo milk or both that has been standardised to fat and solids non-fat percentage given in the table below item A.11.01.11 by adjustment of milk solids. It shall be pasteurised and shall show a negative Phosphatase Test. When fat or dry non-fat milk solids are used, it shall be ensured that the product remains homogeneous and no deposition of solids take place on standing.

--flavoured: by whatever name called it may contain nuts (whole, fragmented or ground) chocolate, coffee or any other edible flavour, edible food colours and cane sugar. Flavoured milk shall be pasteurised, sterilised or boiled. The type of milk shall be mentioned on the label.

--mixed: a combination of milk of cow, buffalo, sheep, goat or any other milch animal and may be a combination of any of these milk which has been made and conforms to the standards given in the

table below item A.11.01.11.

--pasteurized: the term pasteurisation, when used in association with milk and milk products, means heating milk of different classes by a heat treatment as mentioned below and cooling to a suitable temperature before distribution. Pasteurised milk of different classes shall show a negative Phosphatase Test. The terms "Pasteurisation", "Pasteurised" and similar terms shall be taken to refer to the process of heating every particle of milk of different classes to at least 63°C and holding at such temperature continuously for at least 30 minutes, or heating it to at least 71.5°C, and holding at such temperature continuously for at least 15 seconds or an approved temperature-time combination that will serve to give negative Phosphatase Test. All pasteurised milk of different classes shall be cooled immediately to a temperature of 10°C, or less.

--recombined: the homogenised product prepared from milk fat, non-fat-milk solids and water. Recombined milk shall be pasteurized and shall show a negative Phosphatase Test.

--skimmed: the product from milk from which almost all the milk fat has been removed mechanically.

--standardized: cow milk or buffalo milk or sheep milk or goat milk or a combination of any of these milk that has been standardized to a fat and solids-not-fat percentage given in the table

below item A.11.01.11 by the adjustment of milk solids. Standardized milk shall be pasteurised and shall show a negative Phosphatase Test.

—toned: the product prepared by admixture of cow or buffalo milk or both with fresh skimmed milk; or by admixture of cow or buffalo milk or both that has been standardized to fat and solids-not-fat percentage given in the table below item A.11.01.11 by adjustment of milk solids. It shall be pasteurised and shall show a negative Phosphatase Test. When fat or dry non-fat-milk solids are used, it shall be ensured that the product remains homogeneous and no deposition of solids take place on standing.

—sterilized: the term sterilization, when used in association with milk means heating continuously to a temperature of 115°C for 15 minutes or 145°C for 3 seconds, or equivalent approved time-temperature combination to ensure preservation at room temperature for a period of not less than 15 days from the date of manufacture. Sterilized milk shall show absence of albumen by a negative Turbidity Test. Sterilized milk shall be sold only in the container in which the milk was sterilized.

Milk Products: The products obtained from milk such as cream, malai, curd, skimmed milk curd, chhana, skimmed milk chhana, cheese, processed cheese, ice cream, milk ices, condensed milk (sweetened and unsweetened), condensed skimmed milk (sweetened and unsweetened), infant milk food, milk powder, skimmed milk powder, partly skimmed milk powder, khoa, table butter and desi butter.

butter, desi (cooking): the product obtained from cow or buffalo milk or a combination thereof or from curd obtained from cow or buffalo milk or a combination thereof without the addition of any preservative including common salt, any added colouring matter or any added flavouring agent. It shall be free from other animal fats, wax and mineral oils, vegetable oils and fats. It shall contain not less than 76.0 per cent of milk fat by weight. Provided that where butter is sold or offered for sale without any indication as to whether it is table butter or deshi butter, the standards of quality prescribed for table butter shall apply.

—table (creamery): the product obtained

from cow or buffalo milk or a combination thereof or from cream or curd obtained from cow or buffalo milk or a combination thereof with or without the addition of common salt and annatto or carotene as colouring matter. It shall be free from other animal fats, wax and mineral oils, vegetable oils and fats. No preservative except common salt and no colouring matter except annatto or carotene shall be added. It shall contain not less than 80% by wt of milk fats, less than 1.5% by wt of curd and less than 3.0% by wt of common salt. Diacetyl may be added as a flavouring agent but, if so used, the total diacetyl content shall not exceed 4 parts per million. Calcium hydroxide, sodium bicarbonate, sodium carbonate, sodium polyphosphate, (as linear phosphate) may be added for regulating the hydrogen ion concentration in the finished products, not exceeding 0.2 per cent by weight of butter as a whole.

cheese, hard: the product obtained by draining after coagulation of milk with a harmless milk coagulating agent under the influence of harmless bacterial cultures. It shall not contain any ingredients not found in milk, except coagulating agent, sodium chloride, calcium chloride (anhydrous salt) not exceeding 0.02 per cent by weight, annatto or carotene colour, and may contain emulsifiers and/or stabilizers, namely citric acid, sodium citrate or sodium salts or orthophosphoric acid and polyphosphoric acid (as linear phosphate), not exceeding 0.2 per cent by weight. Wax used for covering the outer surface shall not contain anything harmful to health. In case the wax is coloured, only permitted food colour shall be used. Hard cheese shall contain not more than 43.0 per cent moisture and not less than 42.0 per cent milk fat of the dry matter. It may contain 0.1 per cent of sorbic acid or its sodium, potassium or calcium salts calculated at sorbic acid; or 0.1 per cent of nicin either singly or in combination.

—processed: the product obtained by heating cheese with permitted emulsifiers and/or stabilizers namely citric acid, sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) with or without

added condiments, and acidifying agents, namely vinegar, lactic acid, acetic acid, citric acid and phosphoric acid. Processed cheese may contain not more than 4.0 per cent of anhydrous permitted emulsifiers and/or stabilizers, provided that the content of anhydrous inorganic agent shall in no case exceed 3.0 per cent of the finished product. It shall not contain more than 47.0 per cent moisture. The milk fat content shall not be less than 40.0 per cent of the dry matter. Processed cheese may contain 0.1 per cent sorbic acid or its sodium, potassium or calcium salts (calculated as sorbic acid) or 0.1 per cent of nicin either singly or in combination. It may contain calcium chloride (anhydrous) not exceeding 0.02 per cent by weight.

chhana or paneer: the product obtained from the cow or buffalo milk or a combination thereof by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 70 per cent moisture, and the milk fat content shall not be less than 50 per cent of the dry matter. Milk solids may also be used in preparation of this product.

--skimmed milk: the product obtained from cow or buffalo skimmed milk by precipitation with sour milk, lactic acid or citric acid. It shall not contain more than 70 per cent moisture. The milk fat content of the product shall not exceed 13 per cent of the dry matter.

condensed milk, sweetened: the product obtained from cow or buffalo milk or a combination thereof, or from standardized milk, by the partial removal of water and after addition of cane sugar. It may contain added refined lactose, permitted flavours, calcium chloride, citric acid, sodium citrate, sodium salts of orthophosphoric and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such additions need not be declared on the label. Condensed milk sweetened shall contain not less than 9.0 per cent milk fat, not less than 31.0 per cent total milk solids and not less than 40.0 per cent cane sugar.

--milk, unsweetened (evaporated milk): the product obtained from cow or buffalo milk or a combination thereof or from standardized milk, by the partial

removal of water. It may contain added calcium chloride, citric acid and sodium citrate, sodium salts or orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such additions need not be declared on the label. Condensed milk unsweetened shall contain not less than 8.0 per cent milk fat and not less than 26.0 per cent milk solids.

--skimmed milk, sweetened: the product obtained from cow or buffalo skimmed milk or a combination thereof by the partial removal of water and after addition of cane sugar. It may contain added refined lactose, calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such addition need not be declared on the label. Condensed skimmed milk sweetened shall contain not less than 26.0 per cent of total milk solids and not less than 40.0 per cent sugar. The fat content shall not exceed 0.5 per cent by weight.

--skimmed milk, unsweetened (evaporated skimmed milk): the product obtained from cow or buffalo skimmed milk or a combination thereof by the partial removal of water. It may contain added calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such addition need not be declared on the label. Condensed skimmed milk sweetened shall contain not less than 20.0 per cent of total milk solids. The fat content shall not exceed 0.5 per cent by weight.

cream: excluding sterilized cream means the product of cow or buffalo milk or a combination thereof which contains not less than 25.0 per cent milk fat.

dahi (curd): the product obtained from pasteurized or boiled milk by souring, natural or otherwise, by a harmless lactic acid or other bacterial culture. 'Dahi' may contain added cane sugar. 'Dahi' shall have the same minimum percentage of milk fat and milk solids-not-fat as the milk from which it is prepared. Milk solids may also be used in

preparation of this product. Where dahi or curd is sold or offered for sale without any indication of class of milk, the standards prescribed for dahi prepared from buffalo milk shall apply.

ghee: the pure clarified fat derived solely from milk or curd or from desi (cooking) butter or from cream to which no colouring matter or preservative has been added. The standards of quality of ghee produced in a State or Union Territory shall conform to the standards laid down under the PFA Rules.

ice cream, kulfi and chocolate ice cream: the frozen product obtained from cow or buffalo milk or a combination thereof or from cream and/or other milk products, with or without the addition of cane sugar, dextrose, liquid glucose and dried liquid glucose, eggs, fruits, fruit juices, preserved fruits, nuts, chocolate, edible flavours and permitted food colours. It may contain permitted stabilizers and emulsifiers, not exceeding 0.5 per cent by weight. The mixture shall be suitably heated before freezing. The product shall contain not less than 10.0 per cent milk fat, 3.5 per cent protein and 36.0 per cent total solids except that when any of the aforesaid preparations contains fruits or nuts or both, the content of milk fat shall not be less than 8.0 per cent by weight. Starch may be added to a maximum extent of 5.0 per cent under a declaration on the label as specified in sub-rule (2) of Rule 43. The standards for ice cream shall also apply to softy ice cream. In case of ice-cream, where the chocolate or like covering portion forms a separate layer, only the ice-cream portion shall conform to the standards of ice-cream.

infant milk food: the product obtained by drying cow or buffalo milk or a combination thereof, or by drying standardized milk, with the addition of specific carbohydrates (cane sugar, dextrose and dextrans, maltose or lactose), iron salts and vitamins. It shall be free from starch and antioxidants. Its moisture content shall not be more than 5.0 per cent, milk fat content not less than 18.0 per cent and not more than 28.0 per cent, total carbohydrates not less than 35.0 per cent, milk proteins

not less than 20.0 per cent, total ash not more than 8.5 per cent, ash insoluble in dilute hydrochloric acid, not more than 0.05 per cent, iron (as Fe) not less than 4.0 mg/100 g; and vitamin A content not less than 15 i u/g. The process used in drying shall be indicated on the label. Infant milk food shall not show Standard Plate Count of more than 50,000 per gm. Coliform shall be absent in 0.1 gm of the powder. The solubility per cent of the product shall conform to the following standards: Roller-dried, 85.0; Spray-dried, 98.5. The product shall be packed in hermetically sealed containers and the label shall bear the date by which the products is to be consumed.

khoya: the product obtained from cow or buffalo or goat or sheep milk or milk solids or a combination thereof by rapid drying. The milk fat content shall not be less than 20 per cent of finished product. It may contain citric acid not more than 0.1 per cent by weight.

malai: the product rich in butter fat prepared by boiling and cooling cow or buffalo milk or a combination thereof. It shall contain not less than 25 per cent milk fat.

milk ices or lollies: the frozen product obtained from milk, skimmed milk, or milk product with or without the addition of cane sugar, dextrose, liquid glucose and dried liquid glucose, eggs, fruits, juices, nuts, chocolate, edible flavours and permitted food colours. It may contain permitted stabilizers not exceeding 0.5 per cent of the product. The mixture shall be suitably heat-treated before freezing. The product shall contain not more than 2.0 per cent milk fat, not less than 3.5 per cent proteins and not less than 20.0 per cent total solids.

milk powder: the product obtained from cow or buffalo milk or a combination thereof or from standardised milk, by the removal of water. It may contain calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product, and 0.01 per cent of butylated hydroxyanisole (BHA) by

weight of the finished products. Such addition need not be declared on the label. For improving dispersibility, it may contain lecithin to a maximum limit of 0.5 per cent under label declaration as per Rule 42 (ee). Milk powder shall contain not more than 5.0 per cent moisture and not less than 26.0 per cent milk fat. The maximum acidity expressed as lactic acid shall not be more than 1.2 per cent. The plate count shall not exceed 50,000 per gm. Coliform shall be absent in 0.1 gm of the powder. The solubility per cent(min) of the product shall be as follows: Roller-dried, 85.0; Spray-dried, 98.5. The process of drying shall be mentioned on the label. The spray-dried product shall be packed in hermetically sealed containers when the net quantity exceeds 510 gms.

—skimmed: the product obtained from cow or buffalo milk or a combination thereof by the removal of water. It may contain added calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such addition need not be declared on the label. Skimmed milk powder shall not contain more than 1.5 per cent milk fat and moisture shall not exceed 5.0 per cent. The total acidity expressed as lactic acid shall not exceed 1.5 per cent. The plate count shall not exceed 50,000 per gm. Coliform count shall be absent in 0.1 gm of the powder. The solubility per cent(min) of the product shall be as follows: Roller-dried, 85.0; Spray-dried, 98.5. The process of drying shall be mentioned on the label.

—skimmed, partly: the product obtained from partly skimmed cow or buffalo milk or a combination thereof by the removal of water. It may contain added calcium chloride, citric acid and sodium citrate, sodium salts of orthophosphoric acid and polyphosphoric acid (as linear phosphate) not exceeding 0.3 per cent by weight of the finished product. Such addition need not be declared on the label. Partly skimmed milk powder shall not contain more than 5.0 per cent moisture and fat content of the product shall be more than 1.5 and less than 26.0 per cent. Butylated hydroxyanisole (BHA) not exceeding 0.01 per cent by weight of the finished product may be added. The

exact fat content shall be indicated on the label. The minimum solubility of the product shall conform to the following standards: Roller-dried, 85.0; Spray-dried, 98.5. The process of drying shall be mentioned on the label. The spray dried product shall be packed in hermetically sealed containers when the net quantity exceeds 510 gms. Partly skimmed milk powder (sour) used by industry like bakery may contain sodium bicarbonate as a neutralizer provided that the resultant product is labelled as "UNFIT FOR DIRECT CONSUMPTION". The amount of food additives including neutralizers added shall, however, be same as prescribed for partly skimmed milk powder. It shall also conform to other standards prescribed for partly skimmed milk powder except that solubility percentage will be 75 per cent minimum by weight.

P.F.A. SAMPLING PROCEDURES: A REVIEW

(Continued from page 264)

layer, then it will be deficient in fat content. In such cases appropriate techniques of drawing a representative sample are essential. Similarly, fats on long standing may separate into different layers, having different fatty acid composition and hence any sample, not representative of the whole commodity, will lead to erroneous results and will not give the true composition of the product.

Consider the case of novelties like choco-bar, having a coating of chocolate on ice cream layers. If the two are allowed to melt in transit, the resultant analysis of fat composition will not represent the composition of ice cream layer. Hence, the procedure needs to be specified for sampling and transit to the food laboratory. These procedures may serve as guidelines to food inspectors.

These observations have been endorsed by the Central Committee On Food Standards (CCFS) and recommendations submitted to the Government in 1982/1983, but they have not been implemented at the Government level, in the form of amendment to the Act. So, there is an urgent need for the Government to make a special review of the food laws and take measures for protecting the consumers and ensure availability of safe and wholesome foods; while at the same time avoiding any harassment to the food trade and industry.

TABLE 65. Standards of milk (raw, pasteurized, boiled, flavoured and sterilized) prescribed under PFA Rules, 1955, (as amended upto 6th Dec 1985), statewise.

minimum per cent

Name of State	Buffalo milk		Cow milk	
	Milk fat	Milk SNF	Milk fat	Milk SNF
Andhra Pradesh	5.0	9.0	3.5	8.5
Arunachal Pradesh	5.0	9.0	3.5	8.5
Assam	6.0	9.0	3.5	8.5
Bihar	6.0	9.0	3.5	8.5
Gujarat	6.0	9.0	3.5	8.5
Haryana	6.0	9.0	4.0	8.5
Himachal Pradesh	5.0	9.0	3.5	8.5
Jammu & Kashmir	5.0	9.0	3.5	8.5
Karnataka	5.0	9.0	3.5	8.5
Kerala	5.0	9.0	3.5	8.5
Madhya Pradesh	5.0	9.0	3.5	8.5
Maharashtra	6.0	9.0	3.5	8.5
Manipur	5.0	9.0	3.5	8.5
Meghalaya	6.0	9.0	3.5	8.5
Mizoram	5.0	9.0	3.5	8.5
Nagaland	5.0	9.0	3.5	8.5
Orissa	5.0	9.0	3.0	8.5
Punjab	6.0	9.0	4.0	8.5
Rajasthan	5.0	9.0	3.5	8.5
Sikkim	6.0	9.0	3.5	8.5
Tamil Nadu	5.0	9.0	3.5	8.5
Tripura	5.0	9.0	3.5	8.5
Uttar Pradesh	6.0	9.0	3.5	8.5
West Bengal	6.0	9.0	3.5	8.5
<u>Union Territories</u>				
Andaman & Nicobar	5.0	9.0	3.5	8.5
Chandigarh	6.0	9.0	4.0	8.5
Dadra & Nagar Haveli	5.0	9.0	3.5	8.5
Delhi	6.0	9.0	3.5	8.5
Goa, Daman & Diu	5.0	9.0	3.5	8.5
Lakshadweep & Amindive Islands	5.0	9.0	3.5	8.5
Pondicherry	5.0	9.0	3.5	8.5

TABIE 66. All India standards for different classes of milk under PFA Rules, 1955 (as amended upto 6th Dec 1985).

Class of milk	Designation	Minimum per cent	
		Milk fat	Milk SNF
Mixed milk	Raw, pasteurised, boiled flavoured and sterilised	4.5	8.5
Standarised milk	Pasteurised, flavoured and sterilised	4.5	8.5
Recombined milk	Pasteurised, flavoured and sterilised	3.0	8.5
Toned milk	Pasteurised, flavoured and sterilised	3.0	8.5
Double toned milk	Pasteurised, flavoured and sterilised	1.5	9.0
Skimmed milk	Raw, pasteurised, boiled flavoured and sterilised	Not more than 0.5	8.7

Note: (i) When milk is offered for sale without any indication of the class, the standards prescribed for buffalo milk shall apply.

(ii) The heat treatment for the various designated milk shall be as follows:

<u>Designation</u>	<u>Heat treatment</u>
Raw	Nil
Pasteurised	Pasteurisation
Boiled	Boiling
Flavoured	Pasteurisation or sterilisation
Sterilised	Sterilisation

TABLE 67. Bacteriological standards for milk & milk products.

	Standards for satisfactory quality		
	SPC per ml/g (maximum)	Coliform count per ml/g (maximum)	Other tests
Sterilized milk	—	—	Spore count — max 5 per ml Change in titratable acidity — max after incubation for 7 days: 0.02% at 37°C.
Flavoured milk			
a) Pasteurized	50,000	10	Phosphatase test — negative
b) Sterilized	—	—	Spore count — max 5 per ml
Cream			
a) Raw	2,000,000	100	—
b) Pasteurized	60,000	10	Phosphatase test — negative
c) Sterilized	—	—	Incubation at 30°C for 14 days — no change in flavour or appearance
Ice Cream	250,000	90	Phosphatase test — negative
Butter	—	10	Yeast and mould count — max 50/g
Condensed milk (sweetened)	500	—	Yeast and mould count — max 10/g
Evaporated milk	—	—	Incubation of tins for 14 days at 30°C — no bulging due to gas production.
Processed cheese	—	—	Incubation of tins for 14 days at 30°C — no bulging due to gas production.
Milk powders	50,000	90	—
Infant milk foods	50,000	10	—
Malted milk foods	50,000	10	—
Processed cereals	50,000	10	—
weaning foods			
Casein (edible quality)	50,000	10	Yeast and mould count — max 50/g
Vegetable protein in- fant food with milk, flavoured milk, mal- ted skim milk food.	50,000	10	—
Dried ice cream mix, sweet cream butter milk powder, partly skim sour milk powder	50,000	90	—
Burfi.	30,000	—	Yeast and mould count — max 10/g

Source: Dairy Handbook (Processing), NDRI, Karnal, 1980, pp 155-6.

TABLE 68. Standards of ghee quality under PFA Rules.

State/Union Territory	Butyro-refractometer reading at 40° C	Minimum Reichert value	Percentage of	
			FFA as Oleic acid (Max)	Moisture (Max)
Andhra Pradesh	40.0-43.0	24	3.0	0.5
Assam	40.0-43.0	26	3.0	0.5
Bihar	40.0-43.0	28	3.0	0.5
Gujarat:				
Cotton tract areas	41.5-45.0	21	3.0	0.5
Other areas	40.0-43.5	24	3.0	0.5
Haryana:				
Cotton tract areas	40.0-43.0	26	3.0	0.5
Other areas	40.0-43.0	28	3.0	0.5
Himachal Pradesh	40.0-43.0	26	3.0	0.5
Jammu & Kashmir	40.0-43.0	26	3.0	0.5
Karnataka:				
Belgaum District	40.0-44.0	26	3.0	0.5
Other areas	40.0-43.0	24	3.0	0.5
Kerala	40.0-43.0	26	3.0	0.5
Madhya Pradesh:				
Cotton tract areas	41.5-45.0	21	3.0	0.5
Other areas	40.0-44.0	26	3.0	0.5
Maharashtra:				
Cotton tract areas	41.5-45.0	21	3.0	0.5
Other areas	40.0-43.0	26	3.0	0.5
Manipur	40.0-43.0	26	3.0	0.5
Meghalaya	40.0-43.0	26	3.0	0.5
Nagaland	40.0-43.0	26	3.0	0.5
Orissa	40.0-43.0	26	3.0	0.5
Punjab	40.0-43.0	28	3.0	0.5
Rajasthan:				
Jodhpur Division	41.5-45.0	21	3.0	0.5
Other areas	40.0-43.0	26	3.0	0.5
Sikkim	40.0-43.0	28	3.0	0.5
Tamil Nadu	41.0-44.0	24	3.0	0.5
Tripura	40.0-43.0	26	3.0	0.5
Uttar Pradesh	40.0-43.0	26	3.0	0.5
West Bengal:				
Bishnupur Sub-Division	41.5-45.0	21	3.0	0.5
Other areas	40.0-43.0	28	3.0	0.5
Union Territories				
Andaman & Nicobar	41.0-44.0	24	3.0	0.5
Arunachal Pradesh	40.0-43.0	26	3.0	0.5
Chandigarh	40.0-43.0	28	3.0	0.5
Dadra & Nagar Haveli	40.0-43.0	24	3.0	0.5
Delhi	40.5-43.0	28	3.0	0.5
Goa, Daman & Diu				
Goa	40.0-43.0	26	3.0	0.5
Daman & Diu	40.0-43.5	24	3.0	0.5
Lakshadweep	40.0-43.0	26	3.0	0.5
Mizoram	40.0-43.0	26	3.0	0.5
Pondicherry	40.0-44.0	26	3.0	0.5

Note: By cotton tract is meant the areas in the States where cotton seed is extensively fed to the cattle and so notified by the State Government concerned.

2. In Sikkim Boudouin test shall be negative.

Grading of Ghee under 'AGMARK'

The grading of ghee under 'Agmark' is done under the provisions of Agricultural Produce (Grading and Marking) Act, 1937, the General Grading and Marking Rules, 1937, and the Ghee Grading and Marking Rules, 1938. The ghee to be graded under 'Agmark' should be pure and prepared only from the milk of cows and buffaloes. The schedule below gives the grade and definition of quality of ghee and chemical and physical characteristics to which graded ghee should generally conform. The ghee being a biological product, its composition is subject to variation dependent on the type and breed of the cattle, feed given to the cattle and the climatic conditions etc. As such in areas where the chemical characteristics of ghee vary considerably from those prescribed under the rules, regional specifications have been prescribed.

Grade, designation and definition of quality of ghee

Definition of quality		
Grade designation	Texture ⁺	General
Special	The solid phase shall be of well-defined granular structure	Colour White with or without yellowish or greenish tint and shall be uniform throughout
The ghee* shall be pure, clarified milk fat only and shall have a natural, sweet, pleasant odour; agreeable taste and free from rancid or other objectionable flavour. The ghee shall be free from excess moisture and on melting it shall be clear, transparent and free from sediment or foreign colouring matter. The phenolphthalein test, the phytosteryl acetate test and the test for the presence of animal fats (other than milk fat) shall be negative. The chemical and physical constants of ghee shall be characteristic of the type of milk (cow, buffalo, or mixed) from which it is produced and of the season of the year and the place or district where it is produced.		
General	-do-	-do-
Standard	-do-	-do-
The definition of quality shall be the same as laid down under the Prevention of Food Adulteration Rules, 1955, as amended from time to time.		

⁺When cooled below the melting point.

*The purity shall be tested by such tests as may be laid down from time to time by the Agricultural Marketing Adviser to the Government of India; for instance the phytosteryl acetate test.

Grading of Creamery Butter under 'AGMARK'

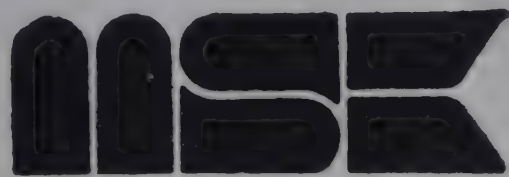
The grading and marking of creamery butter under the provisions of the Agricultural Produce (Grading and Marking) Act, 1937, the General Grading and Marking Rules, 1937, and the Creamery Butter Grading and Marking Rules, 1941. There are two grades of creamery butter — 'Pasteurised Table Butter' and 'Unpasteurised Table Butter'. The purity of butter produced in a particular area and/or season shall be judged with reference to the chemical constants prescribed under the Ghee Grading and Marketing Rules, 1938 for butter-fat (ghee) produced in that area and/or season. The Government has issued detailed directions for the "Methods of sampling and testing butter-fat (ghee) and butter under Agmark" to see that butter conforms to Agmark specifications.

Pasteurised table butter should be made from pasteurised cream and be of good keeping quality and unpasteurised table butter should be of good keeping quality.

- General: Shall be derived from clean and wholesome cream obtained from the milk of cows or buffaloes or both with or without the addition of clean dairy salt. The butter shall contain no other preservatives.
- Flavour and aroma: Shall be clean, pleasant and free from objectionable taint or rancidity. No extraneous flavour except diacetyl shall be added.*
- Body and texture: Shall be firm at 60°F and be neither greasy nor oily. Body shall be compact and show a uniform fine granular surface on breaking.
- Colour: Shall be uniform and not show streakiness, mottling, strains or signs of curd. Only annatto may be used as a colouring matter.
- Moisture content: Shall not be more than 16 per cent uniformly distributed in the body.
- Acidity: Shall not be more than 0.15 per cent as lactic acid.
- Milk fat content: Shall be less than 18 per cent.
- Curd: Shall not be more than 1.0 per cent.
- The purity of butter fat produced in a particular area and/or season shall be judged with reference to the chemical constants prescribed under the Ghee Grading and Marking Rules 1938 for ghee produced in the same area and/or season.

*Under the Prevention of Food and Adulteration Rules it is not permitted.

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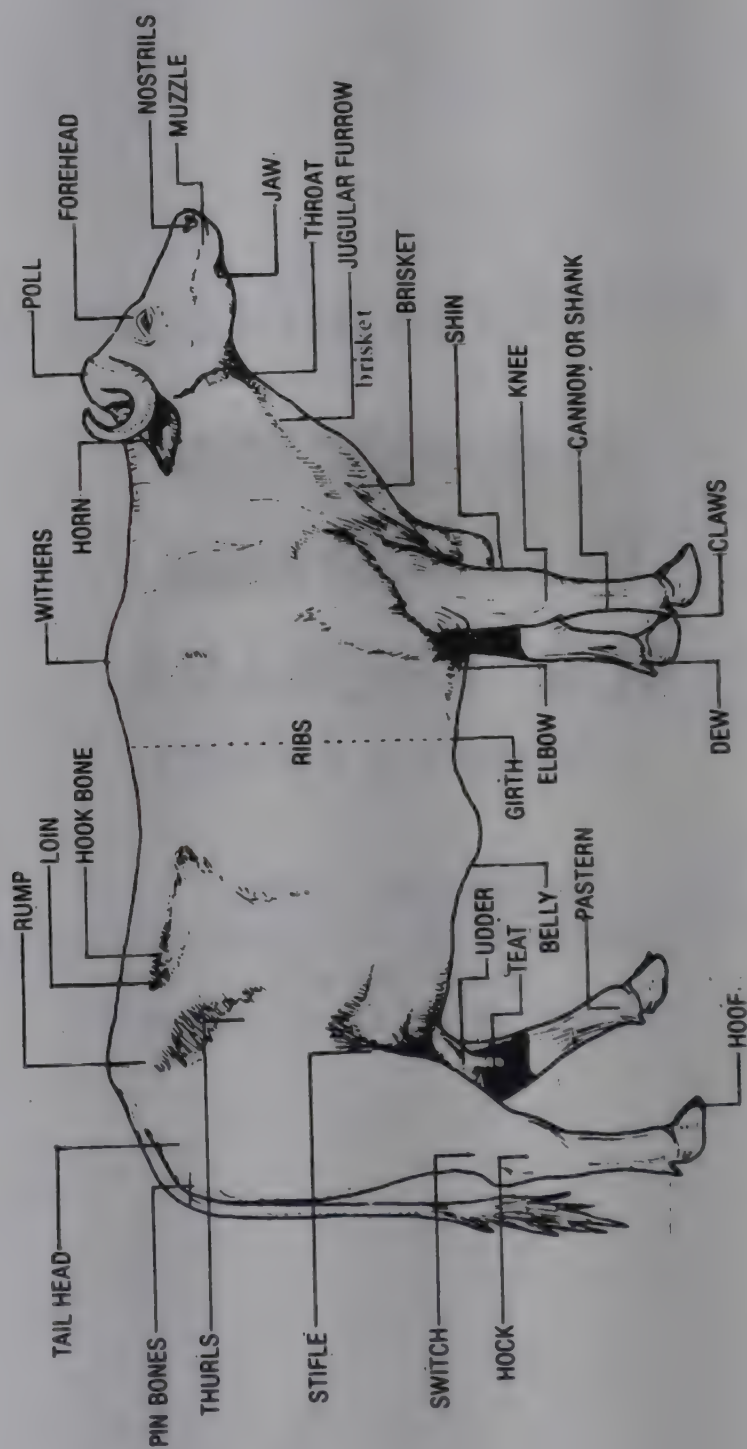
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**PARTS OF BUFFALO**

Glossary

Listed below is a glossary of technical terms used in dairying. It does not include cattle breeds and diseases which are covered in Section II. Definitions of milk and its products under the PFA Rules are also listed in this section. Definitions and descriptions of Indian milk products are presented under the heading, *Indian Milk Products: A Compendium*, in Section II.

A

AI: See artificial insemination.

abdomen: Region of the body containing the viscera other than heart and lungs (i.e. intestine, liver, kidneys, etc.)

abdominal dropsy: Accumulation of serous fluid in the abdomen.

abnormal milk: Milk that differs from the ordinary milk:

- colostrum: milk from cows or buffaloes at least upto three days after calving or parturition;

- milk from cows in advanced stage of lactation;

- off-flavoured milk due to feeding and grazing on certain ingredients and grasses; and,

- milk from cows infected with mastitis, a disease of the udder. Such milk has a distinctly altered physical appearance. It may have either a flaky, stingy or watery appearance, dark or abnormal colour, or a distinct salty taste. This milk is low in SNF (solids-not-fat), lactose, calcium, casein globulin ratio and titratable acidity (alkaline pH) but high in sodium chloride.

abomasum: True stomach; the fourth compartment of stomach of cattle and other ruminants where actual digestion, similar to that in monogastric non-ruminant animals takes place. The walls of this stomach secrete gastric juice.

abortion: The expulsion of the foetus before the completion of the full term of pregnancy.

acid casein: Casein precipitated by various acids.

acidity: The quality of being acid or sour.

Fresh milk is slightly acidic in reaction. Normal acidity of milk varies between 0.12 to 0.15 per cent expressed as lactic acid.

acidophilus milk: Fermented milk produced by inoculating Lactobacillus acidophilus cultures into fresh pasteurised whole milk.

additive: An ingredient or a combination of ingredients added, usually in small quantities, to a food or feed for the improvement of shelf life or quality or nutritive value.

adulterated milk: Milk, the composition of which has been altered by subtraction of some ingredients or by the addition of various substances usually with fraudulent intent or as a means of escaping legislative regulations of standard milk quality.

afterbirth: The placenta and membranes with which the foetus is connected, and which are expelled after delivery.

age at calving: It refers to the age of the animal at which the first calf is born. Age is generally reported in years and months.

agglomeration: Clustering, when milk particles collude amongst themselves and adhere to form clusters.

Agmark: An acronym for agricultural marketing. A national insignia for quality and purity for agricultural and animal produce. Products bearing this insignia imply that they conform to certain grade specifications and standards laid down by Agmark.

albumin: A class of proteins, water soluble which coagulate on heating. Present in whey.

alcohol test for milk: A test used for determining milk stability based on the fact that fresh normal milk with proper salt balance is not coagulated by an

equal volume of 68 per cent alcohol; however, sour milk is coagulated.

algin: A stabiliser which improves the whipping ability and body. It is particularly used in ice cream and chocolate milk.

alimentary canal: The gut — a tube leading from mouth to the anus. The alimentary canal of the ruminants, which include dairy animals, is much more complex than that of other animals. It includes the mouth, the esophagus, the stomach consisting of four compartments (rumen, reticulum, omasum and abomasum), the small intestines, the large intestines and the rectum. These together form a long winding canal approximately 54 metres in an average dairy animal.

androgen: A steroid male sex hormone.

animal husbandry: A branch of veterinary science, which deals with livestock management, production and breeding.

annatto colour: Orange colour extracted from annatto plant seeds, used in butter and cheese.

anoestrous: A condition when a female is not in heat and cannot be mated.

antibody: Substance produced in the body in response to antigen (disease causing organism or foreign protein) and provides immunity against disease by reacting with the antigen.

antigens: Foreign substances, mainly proteins, that stimulate formation of specific antibodies when introduced into the bodies of animals.

anti-oxidant: A chemical which prevents fat oxidation; under the Prevention of Food Adulteration (PFA) Rules butter and ghee can have butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) upto 0.02 per cent. Milk butter should not contain more than 0.01 per cent BHA.

anus: Posterior opening of the alimentary canal.

artificial insemination (AI): Artificial placement of semen in the female genital tract with a view to cause impregnation. The semen is collected from a mature male through an artificial vagina or through electro-ejaculation, examined, diluted and preserved as liquid/frozen semen.

artificial vagina (AV): A device used for collection of semen; simulating vagina. It consists of a thick rubber barrel casing fitted with a detachable rubber liner. At one end is placed a glass

receptacle to retain ejaculated semen. Space between the rubber barrel/casing and liner is filled with warm water.

aseptic packaging: A process of filling sterilized liquid product, including milk and its products, into a sterile package under sterile environment, resulting in a non-refrigerated shelf life of upto six months. Aseptic processing is accomplished by rapidly heating milk to an elevated temperature holding for a set time and rapidly cooling to package temperature in a sterile environment. See also extended life packaging and clean environment.

B

baby food: See infant milk food.

backcross: Mating a crossbred cow back to a bull from one of its two parental breeds.

bacteriophage: A virus which attacks and destroys bacteria. Bacteriophage infection of dairy starter culture can result in slow or zero acid production. The mist from a whey separator could be a source of contamination and dissemination in the plant.

bactofugation: A process of removing 99 per cent of micro-organism in milk by centrifugal force.

balanced: A term applied to diet, ration, or feed having all known required nutrients in proper amount and proportion based upon recommendations of recognized authorities in the field of animal nutrition.

barn: A farm building used for housing animals and for storage of hay, grain, etc.

barny flavour: This flavour may be present in milk and milk products. Suggestive of contamination with dung, feed, hay or absorption of air components in a poorly ventilated stable.

basal metabolism: The energy production and utilization in an animal while at rest.

beef: Meat of adult cattle.

berseem (*Trifolium alexandrinum*): Also called Egyptian clover; a good rabi leguminous fodder with high protein content, rich in phosphate and calcium and easily digestible.

blastocyst: An early embryonic stage, about the seventh day after fertilization.

bovine: Pertaining to cattle, the genus Bos; relating to cow and buffalo.

bran: The pericarp or coating of wheat, rice or other cereal grains removed during processing, the coarse shaffy part of ground grain, rich in nutrients and used in livestock feed.

branding: A mark of identification embossed on the skin/horn/hoof of the cattle with hot iron die or with chemicals.

breed: A group of animals having common origin and possessing certain distinguishing characters not common to other animals of the same species.

breeding: The science and art of bringing improvement in animals through selection and proper mating system.

breeding chute: A wooden or metal enclosure which holds a cow or she-buffalo for mating purpose during breeding.

breeding index: The term is applied to the average number of services per conception in a dairy herd.

buffalo: Belongs to the order Artiodactyle, sub-order ruminantia, family Bovidae, tribe Bovini. Within the Bovini, the three distinguishing groups are Bovina (cattle), Bubalina (Asian buffalo) and Syncerina (African buffalo). The Asian buffalo or water buffalo (Bubalus bubalis Linn) has been domesticated for long and is an important source of milk supply today in the Indian sub-continent. There are about seven indigenous standard breeds of buffaloes, which are known for their milking qualities: Bhadawari, Jaffarabadi, Mehsana, Murrah, Nagpuri or Ellichpuri, Nili Ravi and Surti.

bull: Uncastrated male cattle. The term is also used for males of several other species.

bullock: A castrated bull.

bump: Method of determining pregnancy during the last few months of gestation. The right side of the cow is bumped sharply with hand and the foetus swaying in fluid can be felt.

burfi: A sweet prepared mainly from khoa and sugar. Contains fat 12.5 per cent, lactose 15 per cent, sucrose (max) 48 per cent and moisture 15 per cent.

burnt colour: Colour which appears after over-heating of milk, usually brownish-black.

butter: Table butter is obtained from churning sweet or sour cream of about 32 per cent fat; cooking or desi butter is obtained by churning curd (dahi). Table butter contains not less than 80 per cent milk fat and not more than

1.5 per cent curd. Desi butter has minimum 76 per cent milk fat and 3.0-3.5 per cent curd. Butter is graded under the Agmark scheme as:

- clarified: Butter from which water has been removed by heat, the salt and curd being allowed to settle and the fat filtered off. Known as ghee in India.
- process: Butter made from refined and reworked butter of inferior quality.
- ripened cream: Butter made from cream that has been ripened by the addition of a starter culture.
- sweet cream: Butter made from cream containing not more than 0.2 per cent acid at any time.
- table: Salted butter used for table purposes.

butter fat: Fat in milk.

butter milk: Product obtained after the removal of butter from curd by churning or otherwise, also known as lassi or chhach.

butter oil: Fat concentrate obtained from butter or cream after the removal of all the water and SNF.

butter tub (butter churn): A vessel to agitate the cream, generally a cylinder rotated on a horizontal axis.

butterine: A product composed of 40 per cent milk fat, 40 per cent vegetable fat, 1 per cent milk solids, salt and added vitamin A and D.

butyrometer: Specially designed bottle for testing fat in milk or cream.

C

CIP: Clean-in-place. A method of cleaning dairy equipment and sanitary pipelines by pumping and circulating washing solutions without dismantling them.

CP: Crude protein. See protein, crude.

calf: The young ones of any species of cattle, sexually immature, generally upto six months of age.

calving interval: The period from one calving to the next. Twelve to thirteen months is considered an efficient interval.

caramel (or burnt sugar): An amorphous brittle brown substance prepared by heating cane sugar under controlled conditions. Used as a colouring and flavouring agent in dairy and food

industries.

carotene: A fat-soluble pigment widely distributed in nature and synthesized by plants only. The crystals of carotene vary in colour from a bright yellow to a deep copper according to their thickness. Carotene, along with xanthophyll, another carotinoid, is responsible for the yellow colour of milk fat. Its presence in milk is due to direct transfer from feed.

carrageenan: A product from carrageen (Irish moss) seaweed, used as stabilizer in ice cream.

casein: Constitutes about 80 per cent of the total protein present in milk. It is phospho-protein responsible for the viscosity and white colour of milk. In buffalo milk, casein content is about 3.5 per cent and in that of cow milk 3.0 per cent.

caseinates: Soluble salts of casein used in food formulations for increasing functional and nutritional qualities.

catch: Term used by livestock men to indicate that conception has taken place after breeding.

cattle: A collection of live domestic animals kept as property or for use by an individual; especially bovine animals such as cows, bulls, steers, etc. Formerly applied to all kinds of animals so kept. The best Indian cattle breeds are found in Punjab, Haryana, Rajasthan, Saurashtra, parts of Maharashtra, Madras, Mysore and Andhra Pradesh. In the eastern parts of the country and in the coastal areas, the animals are non-descript and are poor milk producers. There are twenty six known breeds of cattle in India.

cell count: See total cell count.

cheddaring: The combined operations of packing, turning, piling and repiling the cheese curd cubes. It is both for moisture control and for improving body and texture of cheese. Cheddaring end is indicated by titratable acidity of 0.30-0.35 per cent and pH 5.4.

cheese: A product prepared from milk, highly digestible and rich in protein, fat, calcium and other fat soluble vitamins. Essentially a coagulated casein, with its fat, water, insoluble salts, some soluble salts, lactose and albumin; aged or ripened to give it typical aroma and flavour as a result of fermentation caused by bacteria and enzymes. Based

on its body or texture cheese may be classified as hard (cheddar, Swiss, etc) (brick and limburger), medium and soft (camembert).

—cheddar: A variety of cheese made from standardized milk which is then cured for 6 months; hard and white or yellow. Named after a town of the same name in England.

—cottage: Soft, uncured cheese containing not more than 80 per cent moisture; made from pasteurised skim milk. Consists of small particles or flakes of curd which have a meaty consistency. It is ready for use as soon as it is made; does not require prolonged ripening. Shelf life rarely exceeds two weeks.

—hard type: Prepared by different traditional methods using lactic acid cultures to develop required acidity and flavour and rennet as coagulator. The hard cheese may contain salt, permitted stabilizers, annatto colour and sorbic acid, sorbates as preservatives.

—processed: A product prepared by melting cheddar and other types of cheeses, usually the hard pressed varieties and emulsifying them with salts, specially citrates and phosphates and often water. The mixture is heated to kill bacteria present and has, after packing in foil, a long keeping quality. Due to heat treatment, refrigeration is not necessary for storage.

—ripening: Also called curing, souring, maturing. It refers to storing of cheese in cold rooms at 10° to 18°C for at least two to three months, during which the development of acid continues and other chemical and bacteriological changes take place to bring about the desired flavour, aroma, body and texture in the cheese.

—soft variety: Generally prepared from milk of 3.0-3.5 per cent or higher fat content milk or skim milk by adding starter culture for ripening and souring, salt, with or without rennet. For some local varieties sour milk whey is used (for products such as chhana) and lime juice/citric acid solution (for making paneer). Whey is drained from the coagulum and pressed.

cheese vat: The container used for the production of cheese curd.

chhach: A fluid remaining after removing fat by churning curd (dahi) as in the country-method of making butter.

- chhara (also channa):** An acid and heat coagulated indigenous milk product, devoid of whey, prepared from standardised milk by addition of dilute organic acid while milk is boiling; whey is drained off and the precipitate is known as chhana; used for making rasogolla and sandesh.
- chocolate milk:** A drink having whole or skimmed milk, cocoa and sugar with permissible flavour and preservative.
- cholesterol:** A mono-unsaturated, secondary alcohol sterol. It is insoluble in water but soluble in fat and fat solvents. The cholesterol content of normal milk is about 0.07 per cent while that of factory butter is about 0.25 to 0.4 per cent.
- chromosomal aberration:** Any irregularities in chromosome number or morphology of a species.
- chromosome:** Cell organelles carrying the hereditary material DNA, occur in pairs in somatic cells.
- churn or butter churn:** Conventionally a cylinder rotated on a horizontal axis. The shelves are attached to the sides of the cylinder.
- citrate:** A salt of citric acid. Citrates are present in milk. Important stabilizer against heat coagulation. Sodium citrate finds wide use in the preparation of products like sterilized milk, processed cheese, etc.
- clarified milk:** Milk from which visible foreign matter is removed to improve its quality.
- clean environment:** A controlled atmosphere under which standard pasteurized product is packaged into standard containers resulting in longer refrigerated storage.
- clotted milk:** Milk in which thick agglomerates of protein and fat are formed.
- coagulating enzymes:** Enzymes which cause milk clotting.
- coagulation:** Changing liquid milk to a curd-like state by using enzymes, heat and/or acid, or a combination of these agents.
- coliform test:** A test for estimating coliform bacteria in a milk sample; presence of such bacteria is an index of faecal contamination in milk and therefore unhygienic. The number of bacteria is estimated by counting the colonies formed by them in special culture media.
- colostrum:** Also called the first milk; produced by the cow immediately after calving. Yellow in colour, abnormal odour, very slimy and viscous, acidic in reaction and low heat coagulation point. Vital as feed for the new born calf, gives passive immunity through transfer of antibodies from the mother to the calf and increases its disease resistance.
- concentrate:** It is a feed low in fibre (about 20 per cent) and high (over 60 per cent) in TDN on an air dry basis; opposite of roughage. Also, a concentrated source of one or more nutrients used to enhance the nutritional adequacy of a supplement mix; mixture of a high energy feed comprising vitamins, minerals, proteins etc.
- condensed milk:** A product obtained by evaporating water from whole or skimmed milk partly or fully, with or without the addition of sugar.
- condition:** The amount of fat on an animal.
- confection:** Preparation of sweets from milk or its by-products.
- conformation:** Externally measurable or visible variations in shape or body proportion of an animal, more commonly related to breed type conformation.
- cooked flavour:** Flavour defect in milk due to over-heating.
- cottonseed hulls:** Consist primarily of the outer covering of the cottonseed.
- cow:** A mature female of any species of cattle, more commonly referred to Bos taurus or Bos indicus.
- cream:** A portion of milk rich in fat. Under the PFA Rules, cream must have a minimum of 25 per cent milk fat. Other known varieties of cream are single/light/coffee/half-and-half which contain 12-20 per cent fat. Heavy cream contains 32-38 per cent milk fat and plastic cream about 80 per cent milk fat.
- clotted:** Prepared by heating cream to 77-88°C (170-190°F) in shallow pans and then allowing it to cool slowly. The surface layer consists of clotted cream, which is skimmed off.
- sour:** A cream soured with butter culture; gives a clean acid flavour and a heavy consistency to the product.
- synthetic:** A mixture of flour, egg yolk, sugar, water and a vegetable fat, usually groundnut oil.
- table:** Used in the household for various food preparations and for coffee and tea; contains 20 to 25 per cent milk fat.
- ripened:** Cream fermented by lactic acid cultures.
- creamery:** An establishment where milk and cream are received and prepared for

market or converted into butter, cheese and other products.

creamery butter: Butter made in any creamery or plant where butter is churned.

crossbred: Offsprings produced from cross-breeding.

crossbreeding: The breeding of one distinct type or breed of animal with another breed; crossing, hybridizing; breeding between two varieties of same species.

cud: A small wad of regurgitated food in a ruminant's mouth, which is rechewed, often referred to as chewing the cud — ruminating.

cull: An animal below the accepted standard of animals in a herd, afflicted with productive, reproductive or disease problems, and so needs to be removed from the herd. The act of weeding out uneconomical animals.

curd: See dahi.

D

DM: See dry matter.

dahi: It is a product obtained from pasteurized or boiled milk by souring, natural or otherwise by a lactic acid bacterial culture.

dairy: A farm where milk is produced, more commonly, a place where milk and milk products are processed and offered for sale.

dairying: The business of operating a dairy, including distributing and selling milk and its products.

dairy-type: Refers to the conformation of animal good for milk production; wedge shaped body and udder conformation are important for dairy type.

dam: The mother of an animal. Female parent.

daughter-dam comparison: Comparisons made between the production records of daughters to their dams, used for determining estimates of genetic parameters connected with variability in or covers ability among different characters — heritabilities, genetic correlation.

dehorning: Removing horns from the cattle; it is usually done at an early age. The horn bud is removed with hot iron or strong caustic.

density of milk: Varies considerably depending upon the composition of milk. For cow's milk it varies from 1.024 to 1.032

and for buffalo milk from 1.027 to 1.036. For accurate estimation, the reading should be taken at 102°F, the body temperature of the animal, when all the fat is in liquid condition.

density of milk solids (average values):

Milk fat, 0.89-0.93; milk proteins, 1.34-1.348; lactose, 1.666; ash, 4.5-5.5.

desi: Indigenous.

desiccate: To dehydrate or dry for preservation; to remove water from a substance as in the drying of milk to form milk powder.

dextrose: A carbohydrate used as food additive to milk products, commonly called glucose.

digestible energy: The gross energy of feed less the energy lost in the faecal matter. It corresponds to total digestible nutrient (TDN).

digestible nutrient: The portion of feed which is absorbed in blood during the digestive process. In making up rations, it is this part of feed that is considered, and is, usually expressed in terms of percentage.

drench: A medicinal potion administered through a drenching gun or a bottle or a bamboo pipe.

dry cow: A cow which has stopped giving milk.

dry matter: That part of the feed which is not water. It is sum of the crude protein, crude fibre, nitrogen-free extract and ash. All feed formulations are based on DM composition of feedstuff.

dry milking: A complete milking of the cow where udder is completely emptied or dried.

dry period: A period between the end of one lactation and the beginning of another.

drying off: The act of making a cow dry before she is due to freshen.

drying up: The act of a cow going dry too long before her time for freshening.

dual-purpose breed: Cattle bred and kept for two purposes: for milk and draught (work) and milk and producing meat.

dung: The faeces or excrement of an animal.

duodenum: Upper portion of small intestine starting with the end of stomach and ending with jejunum.

dystocia: Difficult calving or any abnormality which renders birth of the young impossible or unduly difficult and prolonged and usually calls for human assistance.

E

ejaculate: Semen produced by a male in an emission during a single mating-collection.

ejaculation: Is a process to release semen by the male at mating.

electrolyte: A substance when dissolved in a suitable solvent or when fused becomes an ionic conductor. Ions are either cations — which carry positive charge — or anions — which carry negative charge. Electrolytes help carry out such bodily functions as the transport, fluid balance, nerve function and sometimes enzyme activation.

embryo: In cattle, a young organism in early stages (first three months) of its development. The period from fertilization until life is noted. After this period and before birth, the young one is called foetus.

embryo transfer: Transfer of a fertilized egg at 4-8 cell stage (embryo) obtained from a donor female (generally genetically superior) to a recipient female. Both the donor and the recipient are prepared through hormone treatment to synchronize in their oestrus cycle. The fertilized eggs are obtained through aspiration using a special catheter, examined for their condition, either stored for further use, or transferred to the recipient. It is used for quicker multiplication of superior stocks and introduction of superior germ plasm without serious risk of introducing diseases.

emulsifier: A substance that makes possible uniform distribution of fat in dairy products. It improves the whipping ability of the mix and its texture. Only emulsifiers specified under rules 60 to 62 of the PFA can be used in dairy products.

emulsion: A suspension of particles of liquid within another liquid — milk is an emulsion of fat in water, while butter is an emulsion of water in fat.

ensiling: A process of making silage from fodder.

enzymes: Organic catalysts elaborated by living cells that catalyze many of the reactions involved in their functions. All enzymes are proteins. The principal

enzymes native to milk are catalase, peroxidase, xanthine oxidase, alkaline phosphatase, acid phosphatase, amylase, protease, lipase and aldolase. Lipases for example cause hydrolytic rancidity in milk and dairy products.

ergosterol: A sterol first isolated from ergot, hence its name. Sterols are characteristic compounds of all natural oils and fats comprising in most cases and greater part of unsaponifiable matter. Ergosterol is converted into vitamin D in the presence of sunlight.

extended life packaging: This system of packaging provides for a refrigerated shelf life of 45-60 days, depending upon the product, made possible by utilizing aseptic techniques. Due to product, package or environment conditions, this system is unable to achieve total sterility.

F

faeces: The excrement of an animal; dung.

false oestrus: Display of oestrus or heat symptoms by a female when she is pregnant or out of season in seasonally polyoestrous animals.

family: The term used to denote relationship but more often to represent a group of animals having a genetic relationship.

fat: Fats are esters of glycerol and fatty acids such as palmitic and stearic. Such esters and their mixtures are solid at room temperature eg milk fat, lard, tallow. Milk fat is a mixture of different triglycerides. It contains significant amount of at least 16 different fatty acids.

fat-free milk: Milk from which most of the fat has been removed.

feed: Harvested forages, grass or other processed feeds made from cereals and cereal byproducts, used for feeding livestock.

feed concentrate: See concentrate.

feed supplement: Feed or feed mixture fortified with extra vitamins and nutrients.

feedstuff: Substance or an admixture of substances forming nutrients for animals; feed ingredients.

fermented milk: Milk fermented by single or mixed strains of lactic acid bacteria and or yeasts. May contain sugar, stabilizers (0.2 per cent), permitted colours

and flavours, fruits, nuts and milk solids. Includes products such as dahi, yoghurt, kefir, kumiss, etc. The minimum acidity in the product varies from 0.6-0.8 per cent as lactic acid.

fertilization: Union of the sperm and ovum to produce the fertilized ovum.

fibre: This is coarse woody cell walls of mature plants. This material is partly digestible by the ruminants. Usually referred to as crude fibre, it is composed chiefly of insoluble carbohydrates such as cellulose and hemi-cellulose generally linked with lignin.

fibrous: High in cellulose and/or lignin content.

filled milk: Milk in which butter fat has been replaced — wholly or partly — by vegetable fat.

flavour: A blend of taste and smell sensations evoked by a substance in the mouth.

flavoured milk: Milk standardized to a certain fat percentage to which some flavour such as chocolate and fruit syrup is added.

flocculation: Loosely aggregated mass of material suspended in or precipitated from a liquid.

fodder: The stalks and leaves of dry crop plants or those of fresh plants given as feed to livestock.

fodder concentrate, fresh green: A highly nutritious disease-free livestock feed produced from cereal grains in a soil-less environmentally controlled chamber under optimum growing conditions. See also fodder production unit.

fodder crops: Fodders are mainly obtained from straws of cereals grown for grain, and from plant residues of pulses and other legumes. Some cereals and legumes are also grown for fodder purposes. Important cereal fodder crops are jowar, maize, bajra, Italian millet, cheena, ragi, and oats. Common leguminous fodder crops are cowpea, cluster bean, moth, soyabeans, berseem, lucerne or alfalfa, shaftal and methra.

fodder grasses: Important fodder grasses cultivated in the country are: Napier or elephant grass, guinea grass, Rhodes grass, para grass, Sudan grass and Teosinte.

fodder production unit: A hermetically sealed and environmentally controlled chamber housing soilless, growing seed-tray rack structure. The chamber equipped with specially designed thermal

panels incorporates built-in nutrient/water reservoir and self-contained recycling irrigation pumping, lighting, aeration/gas exchange and temperature/humidity control systems. Fresh green concentrate fodder is produced in soil-less trays and harvested on an eight-day continuous cycle round the year under any climatic condition. See also fodder concentrate, fresh green.

foetus: The unborn young (after it has taken form in the womb) in later stage of development. The earlier or embryo-stage refers to the period from conception to the third month, after which it is called foetus.

forage: Green stuff obtained from the crops raised for livestock feeding. Usually refers to roughage and crops grown primarily for use as roughage.

fore-milk: Milk drawn out of teats at the beginning of milking.

free-martin: A sexually imperfect, usually sterile female calf born twin to a male.

freshen: Act of starting the lactating cycle directly after calving.

G

galactose: A sugar which is an isomer of glucose, lactose, the principal carbohydrate of milk is a disaccharide composed of glucose and galactose.

garget milk: Milk drawn from an animal suffering from an acute form of mastitis.

gelatine: A protein prepared by boiling collagen with water; used as a stabilizer in ice cream; contributes to smoothness in texture and firmness in the body of the frozen product.

Gerber test for fat: A test for determining fat in milk; sulphuric acid and amyl alcohol are used to centrifuge out fat from milk, which is directly estimated in the Gerber tube.

germ plasm: Genetic material in the form of sperm or ovum. Generally, superior germ plasm, selected on the basis of genetic merit, is utilized in breeding so as to improve production.

gestation: Pregnancy; in cows the period during which the unborn calf is carried in the uterus or womb of the mother; time between conception and calving. It is 282 days in cow and 310 days in

buffalo.

ghee: Clarified butter fat prepared by boiling butter or cream.

globule: Small spherical particles, specially that of milk fat.

glycogen: A polysaccharide which is formed in the liver and depolymerized to glucose to serve as a ready source of energy when needed by the animal; also known as animal starch.

goat: The goat, a small ruminant, belongs to the family Bovidae (hollow-horned ruminants) and is a member of the genus Capra. It is known as the 'poor man's cow' in India and as 'wet nurse' of infants in Europe. Usually, there is a wrong notion of the role of this species in causing desertification. It is most playful animal and can eat all kinds of vegetation. Is generally a browser but can be stall fed.

goat milk: It is similar to cow milk in composition, but fat globule size is much smaller as compared to cow milk. It makes the goat milk easily digestible. It has also high mineral content than the cow milk.

goshala (also gowshala): A charitable institution where generally unwanted/culled cattle are maintained.

grading up: Mating of a pure bred sire of a superior breed to non-descript cows.

grass: Herbage suitable or used for grazing animals. Plants belonging to the family Gramineae, mostly herbaceous, including wheat and other cereals, as well as common pasture and turf grasses.

graze: Feed on growing grass; process of eating the grass, natural/cultivated vegetation in the field by the cattle.

gulabjaman: Khoa based sweet. Round or cylindrical in shape, dark brown exterior, soaked in thick sugar syrup, firm body, smooth texture.

excitement, hence period when female is ready for breeding through natural/AI service.

heat exchanger: A piece of regenerative equipment used in milk plants for heating incoming cold milk and cooling outgoing hot milk.

heat stability of milk: The time required to ensure coagulation in milk; it is the relative resistance of milk to coagulate in the sterilizer.

heifer: A female mature young cow, usually one that has not produced offspring; ready for breeding usually around two years of age; the name is also applied to young cows in milk as a two-year old heifer.

herbage: Green plants collectively; specially those used for pasturage.

herd: A group of cattle collectively considered as a unit.

herd replacement: Selecting heifers for the dairy herd. It is desirable to select the progenies of better producing cows which are large, well grown, healthy and are capable of beginning their milk production function at as early an age as possible.

hereditary: Physical and productive characteristics inherited from parents.

high temperature, short time (HTST) pasteurization: Milk is heated to a temperature of 71° to 72°C for not less than 15 seconds and immediately cooled to below 10°C.

homogenize: To break up fat globules of milk by forcing through minute opening under pressure in order to make the particles uniformly small and evenly distributed.

hormone: A chemical substance secreted by the ductless glands and which acts upon a specific tissue, organ or another ductless gland. Some of the changes produced by hormones affect growth, digestion, metabolism, milk secretion, the "let down" of milk etc.

Hortvet apparatus: The apparatus used for determining freezing point of milk.

host: Any living animal or plant affording subsistence or lodgement to a parasite.

humanized milk: Whole cow or buffalo milk modified in chemical composition to resemble human milk.

hydrogen peroxide: An anti-microbial agent; can be used as milk preservative.

half sib: One of the pair of animals having one common parent, half brother or half sister. Sib, abbreviation of sibling.

hay: Forage preserved in dry form without any appreciable loss in its nutritive value.

heat: Sexual excitement, specially in the female cattle; time or duration of such

ice cream: A frozen dairy product made by suitable blending and processing of cream and other milk products, together with sugar and flavour, with or without colour or stabilizer and with the incorporation of air during the freezing process.

ice cream mix: It consists of all ingredients of ice cream with the exception of flavours, fruits and nuts. All the ingredients are accurately calculated and compounded to give the proper composition.

inbreeding: A system of mating in which mates are genetically closely related than the average relationship, ie, brother-sister, parent-offspring. Inbreeding tends to uncover deleterious characters due to recessive gene. It reduces growth, reproduction and disease resistance.

incubation: The growing of a culture of bacteria in an incubator to favour development of the organism. In the case of infectious diseases, the time between the infection and the appearance of the first symptoms is generally referred to as incubation period. Holding of sample of milk at a fixed temperature is also termed as incubation.

incubator: An apparatus for maintaining cultures of bacteria and other materials at a constant and suitable temperature.

infant milk foods: Standardized milk dried after addition of specified carbohydrates (cane sugar, dextrose and dextrine, maltose or lactose) iron salts and vitamins. It should not contain starch or anti-oxidants. Moisture content 3.5-5.0 per cent, milk fat 18.0-28.0 per cent, total carbohydrates not less than 20.0 per cent, minerals upto 8.5 per cent. The product can be dried by spray or roller process and should have stipulated solubility and hygienic quality. It is to be sold in hermetically sealed containers.

inheritance: Acquisition of characters or traits by transmission from parent to the offspring.

inseminate: To implant the male sperm into the genital tract of a female, either naturally or artificially.

instantization: The process by which dried milk and milk products are made instantly soluble by solubilization or rehydration.

irradiation: The exposure of materials to radiations especially ultraviolet rays, which convert ergosterol into vitamin D, destroys bacteria, bleaches fat, produces slight burnt flavour and causes reducing conditions in milk by catalysing the oxidation of unsaturated fatty acids.

isolation: Keeping animals separated from the rest of the herd; usually done when animals are suspected of suffering from some infectious or contagious disease. Also, quarantine.

junket: A simple form of soft rennet cheese, often made at home by curdling milk with junket tablets, which contain rennet in dry form.

kalakand: Khoa based sweet, light caramel colour, granular texture, firm body.

kefir: A self-carbonated beverage containing 1 per cent lactic acid and 1 per cent alcohol prepared by inoculating milk with kefir culture (grains).

kheer (basundi): An Indian dessert prepared by partial dehydration of whole milk with sugar and rice in an open pan over direct fire.

khoa (also known as mava): A product obtained by rapid and continuous evaporation of moisture from whole milk in an open pan over direct fire constantly stirring and scrapping till it reaches a semi-solid consistency. Khoa is the base for various sweets like peda, burfi, gulab-jamun, palghoa, etc.

khurchan: A concentrated whole milk product prepared by simmering milk without stirring. As the skin is formed on the surface it is broken to give flaky texture to the product. Sugar is added along with flavouring.

kjeldahl method for nitrogen estimation: A common method used for determination of nitrogen in milk and milk-products. In

this method the weighed sample is digested with acid and then steam distilled with excess alkali. The distillate is collected in boric acid solution which is then titrated against a standard acid. The calculations are made to obtain protein content.

kulfi: An indigenous ice cream frozen in small earthen containers.

kumiss: A Russian fermented milk, mildly alcoholic. The fermentation is primarily due to the growth of Bacterium bulgaricum.

L

lactation period: Time between calvings during which the cow produces milk.

lactic acid: An organic acid formed in the souring of milk. It is produced by the action of bacteria, particularly Streptococcus lactis on milk sugar lactose.

lactogen (galactin): A hormone which brings about the secretion of a fluid resembling colostrum milk. This hormone is secreted by the anterior lobe of the pituitary gland located at the base of the brain.

lactoglobulin: The fraction of milk serum proteins which is precipitated by 50 per cent saturation with ammonium sulphate. Colostrum contains much more lactoglobulin than normal milk.

lactometer: An instrument for measuring the specific gravity of milk.

lactose: The principal sugar of the milks of all mammals. Cow milk contains 4.5-5.0 per cent lactose. Relatively less soluble than cane sugar. On fermentation gives rise to lactic acid. Improper crystallization of lactose leads to 'sandiness' in ice-cream and sweetened condensed milk.

laasi: Dahi diluted with water, sweetened or salted.

leben: Milk obtained with special cultures contains about 1.25 per cent alcohol and 1 per cent lactic acid.

lecithins: A phospholipid mixture of diglycerides of fatty acids; used for emulsifying, dispersing agent and as anti-oxidant.

legumes: Plants of the family Leguminosae which bear seeds in pods as in peas and beans. Legumes are generally rich in

both protein and mineral content and make excellent fodder/forage for dairy cattle. Because of their specialized root system legumes tend to fix nitrogen and enrich the soil.

lignin: Phenolic substances linked to cellulose in fibrous parts of plants. It is much less digestible than cellulose.

line breeding: A system of breeding which involves the mating of two animals to concentrate on the qualities of some superior ancestor.

lipase: A fat-splitting enzyme which has been shown to be a normal constituent of milk of cattle that have been in milk for an abnormally long period. This enzyme splits up the fat into glycerol and fatty acids, the latter being responsible for some of the off-flavours in dairy products. Cases of rancidity in milk products are attributed chiefly to the release of butyric acid in the butter fat by the enzyme, lipase. See also enzymes.

lipolysis: The decomposition or splitting up of fat.

loose housing: Cattle yards and shelters large enough to permit cows to move at will from indoors to outdoors and from resting area to the place of feeding.

lucerne: Leguminous fodder crop, perennial in nature and provides green nutritionally rich fodder throughout the year.

M

ME: See metabolizable energy.

makkhan: Desi butter obtained by churning whole milk dahi.

malai: Thick cream layer formed on the milk during simmering.

maltose: A disaccharide of two glucose units produced as a result of action of amylase on starch used as an additive to infant food.

mammary gland: Glands which secrete milk, udder.

mammary veins: Veins carrying blood away from the udder and found just under the skin on the abdomen barrel of the cattle.

manger: Feeding trough for animals.

margarine: An imitation butter; generally a mixture of various refined vegetable oils, fats and hydrogenated oils.

market milk: Fluid milk sold to the consumers.

mastitis milk: See abnormal milk.

meconium: The first faeces of the calf.

membrane processing: See ultrafiltration.

metabolism: Process of making and breaking of bio-chemicals in living cells, used in the vital processes and activities and generating energy.

metabolizable energy (ME): That part of the gross energy of a feed which is not carried off in urine, faeces or gases. It is the energy that is available for use by the body in carrying on the work of digestion, external work, growth, reproduction and production of milk etc.

methylene blue test: A test for determining freshness of milk. Methylene blue is added to the milk and the time for disappearing of the colour is noted. The longer it takes to discolourise, the better is the bacteriological quality of milk.

microbe: A minute living entity, viral, bacterial, fungal or protozoan, too small to be seen without the aid of a microscope. Also called microorganisms.

milk: A white or yellowish fluid secreted by the mammary gland of mammals. It consists of emulsion of fat in water with casein and other proteins, milk sugar and inorganic salts. That secreted before parturition and for days thereafter is called colostrum. According to Prevention of Food Adulteration Rules, 1955, the percentage of milk fat and solids-not-fat (SNF) in different classes and designations of milk specified respectively are as follows: Buffalo milk (5.0-6.0 and 9.0), cow milk (3.0-4.0 and 8.5), standardized milk (4.5 and 8.5), recombined milk (3.0 and 8.5), toned milk (3.0 and 8.5), double toned milk (1.5 and 9.0) and skimmed milk (not more than 0.5 and 8.7). The fat percentage for the milk of cow and buffalo varies from State to State and is detailed in the PFA Rules (for details please see Section II).

--abnormal: See abnormal milk.

--adulterated: See adulterated milk.

--blended: Milk modified in composition to have a definite percentage of its constituents.

--cistern: An area in the udder into which milk is secreted before entering the teats.

--chocolate: See chocolate milk.

--condensed: See condensed milk.

--condensed, sweetened: Milk from which water is removed partially and sugar added.

--density of: See density of milk.

--desiccated: Milk from which most of the water has been removed.

--double toned: Milk that contains maximum 1.5 per cent fat and 9.0 per cent SNF.

--fat free: See fat free milk.

--fermented: See fermented milk.

--filled: See filled milk.

--flavoured: See flavoured milk.

--homogenized: Milk which has been treated in such a manner as to ensure the break up of fat globules to such an extent that after 48 hours of quiescent storage no visible cream separation occurs on the milk.

--humanized: See humanized milk.

--irradiated: Milk subjected to ultraviolet light to develop vitamin D.

--malted: A product obtained by combining milk with the extract from a mash of ground barley-malt and wheat flour, with or without the addition of salt, sodium or potassium bicarbonate, cocoa powder. Starch may be absent. Contains 3.3 per cent moisture, 14.6 per cent protein, 21.5 per cent lactose, 8.5 per cent milk fat, 1.5 per cent maltose and 47.8 per cent dextrine.

--modified: Milk so modified in composition to nearly approach the composition of human milk eg, by reducing fat content and protein content and increasing the amount of lactose. Milk is also modified to meet special requirements like lowering the lactose content by incorporating the enzyme lactase to hydrolyse the milk sugar.

--recombined: Is the homogenized product prepared from milk fat, non-fat milk solids and water. Should have minimum 3 per cent fat and 8.5 per cent SNF and should be pasteurized.

--reconstituted: Prepared by dispersing whole-milk powder in water in the ratio of 1 part powder to 7-8 parts water.

--ropy: Milk in which long strands of certain polymers are synthesized by microbial contaminants; a milk defect.

--skim: Milk from which almost all fat is removed.

--skim, condensed sweetened: Obtained from skim milk by partial removal of water and with addition of cane sugar.

--skim, powder (SMP): Made by removing

most of the fat and water from milk. The moisture content must not exceed 5 per cent and the fat content should not exceed 1.5 per cent.

- soft curd: Milk which on treatment with rennet does not give firm clot. It is very useful for persons who cannot digest ordinary milk.
- sour: Milk giving sour taste due to lactic acid produced by bacteria; indicates defective milk, unfit for consumption as such.
- standard: Means cow milk or buffalo milk or a combination of both, that has been standardized to 4.5 per cent milk fat and 8.5 per cent SNF by abstraction and/or addition of milk fat, or by addition of skimmed milk, or by addition of recombined or reconstituted skimmed milk. Standardized milk should be pasteurized.
- sterilized: Involves heating of milk, homogenization and thereafter filling it in bottles, capping and heating bottles at 110° to 116°C under about 7 kg pressure for 30 minutes, and finally cooling the milk to ordinary temperature.
- stingy: Milk from infected udder having tough stingy clots.
- structure of: Milk consists of serum containing fat globules, lactose, salts, albumin, globulin and solid particles in colloidal or finely divided state having casein and attached calcium phosphate.
- toned (also called single toned milk): Milk obtained by the addition of water and skim milk powder to whole milk. It contains a maximum of 3.0 per cent fat and 8.5 per cent solids-not-fat.
- milk desserts: Puddings and confections.
- milk fat: Fat in milk exists in the form of small globules, an oil in water type emulsion. Milk fat is composed of a number of glyceride esters of fatty acids, which are both saturated and unsaturated.
- milk filter: A filter cloth or pad of the desired pore size which can retain the smallest particle.
- milk plasma: When fat is removed from milk, the part remaining is known as plasma.
- milk protein: Consists mainly of casein, B-lactoglobulin, lactalbumin, etc. Casein exists only in milk.
- milk ring test: A method for detecting the presence in milk of antibodies to Brucella abortus. To the milk sample is added one drop of a dilute suspension of killed, stained cells of Brucella

abortus; the tube is shaken and incubated. In a positive test a coloured band forms at the surface.

milk stones: Accumulated precipitate of milk proteins, fat and minerals on metal surfaces of dairy equipments, or a combination of these substances with salt from hard water and alkali detergents. Source of serious bacterial contamination.

milk sugar: See lactose.

milk solids-not-fat: See solids-not-fat.

milk well: Area on the body of cow where milk veins enter body cavity.

miltone: Vegetable toned milk developed by CFTRI, Mysore. Contains total solids 11.5 per cent: proteins 4 per cent, fat 2 per cent, lactose 2.5 per cent, glucose and malt dextrine 2.5 per cent.

mithun: An obscure, shy, semi-wild bovine animal (Bos frontalis), confined to valleys in India's north-eastern region (Arunachal Pradesh and Nagaland); primarily reared for meat. It crosses well with local cattle which are used for milk production. Its milk is creamy-white and thick, with high total solids.

N

NE: See net energy.

negative balance: An animal is in negative balance when it is secreting and/excreting more nutrients than it is receiving in its feed.

net energy (NE): The metabolizable energy (ME) minus the energy needed for the work of digestion is called the net energy. It is the energy that an animal has been left with to work, put on fat, or produce milk.

neutralise: To remove the excess acidity from a dairy product usually cream or ice cream mix. Neutralization is practised (i) to improve the keeping quality of the milk product, (ii) to minimise the development of undesirable flavours and (iii) to avoid the excessive loss of fat that results from pasteurizing acid cream. A dairy product should never be neutralized below the titratable acidity that is average and normal for the product.

neutraliser: Alkaline substance for controlling milk acidity. Neutralisers

permitted under PFA Rules are sodium hydroxide, sodium bicarbonate.

nick: When the animals produce excellent offspring, they are said to nick well.

nutrient: Feed constituent essential for life eg, carbohydrates, proteins, fats, minerals and vitamins.

nutrition: The ingestion, digestion and assimilation of feed constituents for growth and production of animals.

nutritive ratio: The ratio between the digestible protein and digestible non-nitrogenous nutrients (digestible carbohydrates + digestible ether extract x 2.25).

nutritive value: It is the nutritional status of a feed or the per cent availability of nutrients from a feed.



oats (Avena sativa): A cultivated fodder crop; a rabi season forage cereal which requires climatic conditions similar to that of wheat and barley.

oestrogen: A female sex hormone secreted in the graffian follicle and inducing heat or oestrus in the female animal.

oestrus: Sexual excitement period in the female animal, when she is ready for breeding through natural/AI service.

off feed: A term often used in reference to the condition of loss of appetite in farm animals. The condition may be caused by various stomach disturbances or other diseases or ailments. Off feed is the first symptom usually shown by a sick animal.

oil cakes: Protein rich feeds, highly palatable, easily digested and generally used to balance ration of farm animals in respect of proteins.

oleic acid: The principal unsaturated fatty acid of butterfat present upto 20-40 per cent. The development of a tallowy flavour in dairy products is usually caused by oxidation of this acid.

Operation Flood (OF): World's biggest dairy development programme aimed to modernize India's dairy industry was launched in July 1970 to 'flood' the four metropolitan cities with milk from 18 'Anand-Pattern' dairy cooperatives in their hinterland milkshed areas. The Rs 116-crore integrated project which ended in

June 1981 was designed and executed by the National Dairy Development Board (NDDB) and the Indian Dairy Corporation (IDC). Funds for this project were generated through the sale of dairy commodities donated by the UN/FAO World Food Programme. It paved the way for an expanded programme, the seven-year Operation Flood II. It was officially launched on October 2, 1979, with an investment of Rs 500 crores. Its third phase commenced in April 1985, coinciding with the Seventh Plan with an outlay of Rs 6,812.9 million. Presently, OF covers 250 districts, grouped into 168 milkshed districts in 23 State/UTs, covering over 5 million farm families in 49,000 cooperatives.

osmosis: The diffusion through a semi-permeable membrane, separating two liquid solutions. It tends to equalize their concentrations across the membrane.

outbreeding: Breeding or mating of individuals, which have lower genetic relationship than the average of the population.

outcrossing: Mating unrelated animals generally within the same pure breed.

ovarian follicle: Sacks or pockets which form in the body of the ovary in which the egg ripens and matures. The follicle also contains a fluid mainly consisting of estrogen. Also known as graffian follicle.

ovary: Principal reproductive organ of the female in which the eggs are produced. The ovary has an endocrine function secreting oestrogen from the follicle and progesterone from the corpus luteum.

overrun: As applied to butter, the term refers to the increase in the weight of butter over that of butter fat used on account of incorporation of water, curd and salt in the making of the finished product. In relation to ice cream, it describes the increase in the volume of ice cream over that of ice cream mix used due to the incorporation of air.

oviducts (fallopian tube): Two tubes in the female through which ovum (egg) moves from ovary to the cavity of uterus.

ovulation: The release of the ovum from the ovary on or after the cessation of oestrus.

ovum: Female reproductive cell (egg) which on fertilization by sperm and subsequent development in the uterus transforms

into a foetus.

ox: The domestic bovine quadruped, especially an adult castrated male which is used as a draught animal; bullock.

oxidation: A process involving addition of oxygen, loss of hydrogen; also a reaction involving the loss of electron.

oxidized flavour: Defect in milk due to fat oxidation.

oxidizing agents: Important in dairying industry since they are used (i) as preservative, eg hydrogen peroxide in milk, (ii) to sterilize plants and utensils, eg hypochlorides, and (iii) to prevent gas formation by bacteria, eg nitrates in cheese.

oxytocin (let-down hormone): A hormone secreted by the pituitary gland, situated at the base of the brain, which causes the cow to "let down" her milk when the proper stimulus is applied.

P

pail feeding: Milk feeding to calves in buckets. Calf is taught to drink from bucket by placing the fingers of one hand across the calf's nose or into the mouth while it is allowed to nibble at the fingers, which are slowly moved down into the milk and then removed as soon as calf's nose enters milk.

palpation: Feeling the surface with hand to determine the condition of a normal or diseased organ such as udder or internal organ; palpation of reproductive organs for determining the reproductive status, heat, pregnancy and reproductive disorders is called rectal palpation.

paneer: Soft cheese prepared from whole milk and skimmed milk. Milk is heated to boiling temperature and lime juice, citric acid, or sour whey is added with continuous stirring till clear whey separates. The coagulum is pressed out from whey. Paneer contains 70 per cent moisture (max). The whole milk paneer should contain 50 per cent milk fat on dry matter basis. In skimmed milk paneer, the fat on dry matter basis should not exceed 13 per cent.

--surti: Soft cheese prepared from buffalo milk with about 7 per cent fat to give good texture. After ripening with a starter, rennet is added to set the milk.

When properly set, the curd is scooped in thin slices and placed in small baskets, salt being added between layers. Whey is allowed to drain out, and the coagulum carefully turned 3-4 times and cheese cakes formed.

pantooa: A sweet with the ingredients of khoa, chhana, baking powder, maida, sugar, water and ghee.

para grass: A grass that is native of South America and West Africa; grown as fodder grass in various parts of India.

parturition: The act of giving birth to an offspring; calving.

pasteurization: A heat treatment process which secures destruction of pathogenic organisms without impairing the commercial value of the product.

--high-temperature short-time (HTST): See high-temperature short-time pasteurization.

--ultra high temperature (UHT): Heat treatment to milk at a temperature of 135° to 150°C for 1-6 seconds.

pasteurized milk: Milk which has undergone pasteurization.

payyodhi: Sweetened dahi having 6-12 per cent sugar. It has light brown colour and caramelized taste.

peda: A confection prepared from khoa/mava with sugar, flavouring and nuts.

pedigree: Parentage of the animal, could involve generations farther than of immediate parents. Pedigree records are used in combination with other related records in determining genetic merit.

persistence: The degree to which milk yield in early lactation is maintained by the cow during the rest of her lactation. A measure of the shape of the lactation curve.

pH: Potential of hydrogen ion in solution, a measure of acidity or alkalinity.

phenotype: The external characters of an individual which are measurable and observable, eg, milk production, weight at a particular age. It is a combined expression of genotype and environment.

phosphatase test: A test to determine heat treatment efficiency in the pasteurization of milk. In the process of pasteurization, phosphatase enzymes are destroyed.

phospholipides: Lipids containing phosphoric acid and nitrogenous bases, important factor in auto-oxidation of milk fat and development of oiliness and cardboard flavour. Lecithin,

cephalin and sphingomyelin are the phospholipides present in milk.

phytosterol: A common sterol found in vegetable fat. The acetate of animal sterol and vegetable sterol differ in their melting points which form the basis of test for the adulteration of ghee.

pituitary gland: A gland located in the brain (also called master gland of the body); it produces many hormones which regulate the growth, including mammary secretions and regulate and stimulate ovaries and testes.

placenta: Embryonic and maternal tissue in close union by which the foetus is nourished in the uterus and is usually expelled after the foetus during delivery. It is attached to the placenta by the umbilical cord.

plasma: Non-fat milk, i.e., proteins, lactose, salts and various minor constituents.

platform test: A rapid test conducted at the milk receiving platform of a dairy to determine milk quality.

polled: Cattle without horn by birth.

post-partum: Following the birth of a young one.

pregnancy test: Is done both by rectal/abdominal palpation as well as by determining the level of certain hormones in the urine.

premature birth: Generally expulsion of the young before full term but late enough to permit independent survival.

preservative: Any material that prevents decomposition, fermentation, spoilage and decay of dairy products.

prestratification method: A process of ghee making from desi butter by heating it and holding it at 80°C for 30 minutes when it separates into three layers. Buttermilk serum layer is drawn out and the two layers of scum and fat are boiled for curd precipitation. Good quality ghee is obtained.

processing: In relation to dairying, the term is generally used to include the process as of cooling, pasteurizing and bottling of milk. Also refers to the process of making cheese, butter, condensed, evaporated and dried milk.

progeny: Offspring of an individual.

progeny test: Estimating the genetic value of an individual measuring or observing the performance, appearance or other characteristics of a group of progeny; is essential in case of sex limited

characters with low heritability.

progesterone: A hormone produced by the corpus luteum of the ovary involved in many reproductive functions including preparation and maintenance of uterus for pregnancy.

protein, crude (CP): The sum total of protein in food and feeds, generally determined in terms of nitrogen.

--digestible (DCP): That part of the crude protein in feed which the animal can digest.

proteolysis: It is a process of breaking down of complex proteins by protease enzymes or by acids or alkalies, or by heat. Significant proteolysis occurs on incubation of cow's milk at 30°C even when the bacterial counts are negligible or bacteria are inhibited by antibiotics.

proven sire: A bull whose genetic merit has been demonstrated by his daughters about his ability to transmit the desired dairy qualities such as milk production. A sire that has a certain number of daughters with known production records.

puberty: The age at which the reproductive organ of the animal becomes functional.

pure breed: An animal whose ancestry can be traced back through all lines of the foundation animals of the breed.

putrefaction: The decomposition of organic matter by the action of certain micro-organism, emitting foul odour; on account of the presence of lactic acid in dairy products putrefaction rarely occurs with the exception of putrid butter and very ripe cheese with high water content.

putrid butter: A flavour defect in butter, result of protein decomposition of certain species of putrefactive bacteria. Butter made from sweet, unripened cream and light salt butter are very susceptible to putrid flavour.

R

rabri: A specially prepared concentrated and sweetened whole milk product, containing several layers of clotted cream. It contains 30 per cent moisture, 20 per cent fat, 10 per cent protein, 17 per cent lactose, 3 per cent ash and 20 per cent sugar.

rancidity: A flavour defect in milk due to oxidation and hydrolysis of fat by lipases.

rasagolla: A Bengali sweet delicacy prepared from fresh chhana (coagulum prepared by adding sour whey to hot milk and drained), kneaded to a creamy consistency with white flour (optional), with flavouring and made into small balls which are immediately boiled in sugar syrup and kept in the syrup. Rasagolla contains moisture 55 per cent (max), fat 5 per cent, proteins 5 per cent, sugar 45 per cent (max) and has a spongy texture.

ration, maintenance: The amount of feed required to maintain an animal when at rest and not yielding milk or work. An animal receiving a proper maintenance ration will neither gain nor lose in protein, fat or mineral matter; neither gain nor lose weight.

production: The ration that an animal consumes in addition to the maintenance ration in order to increase its body weight, do muscular work or yield milk.

regeneration: The method of using heat of pasteurized milk to warm up the cold, incoming raw milk. Cold milk is used to cool the hot milk, an economy in fuel is achieved.

rennet: A proteolytic enzyme, renin, used in cheese making. It is usually prepared from fourth or true stomach (abomasum) of the calf. Rennet is produced from animals, vegetable and microbial sources. The preparation having high ratio of clotting power to proteolytic activity is preferred for cheese making.

repeatability: The tendency for an individual to repeat its performance, measured as an intra-class correlation based on repeated records of the same animal. It is generally known as the upper point of heritability. In addition to component of genotype variance it does involve permanent environmental variance.

reproductive cycle: Also sexual cycle, oestrus cycle. Cyclical changes in animal behaviour reproductive functions of a mature female, comprising periods of proestrus, oestrus, metoestrus and dioestrus. The cycle is of a duration of 21 days on an average and repeats till the animal becomes pregnant.

Resazurin test: Measures freshness of milk; Resazurin gives a characteristic blue colour in fresh milk. Reduction of the dye is indicated by a gradual colour change through various shades which are compared with the colour chart and the

milk grouped under four classes. The colour changes as from blue to purple to lavender to pink. 1. Good milk, colours between 1 and 6; 2. Fair milk, colours between 7 and 13; 3. Poor milk, pink, but not faded; 4. Very poor milk, decolourized.

reverse osmosis: See ultrafiltration.

roller drying: A process of drying milk by applying milk in thin film upon the smooth surface of a continuously rotating steam heated metal drum, roller or cylinder to produce dried milk which is scrapped off continuously by stationary knife/scrapper. The milk film is then grounded to obtain the powder.

roughage: A coarse feeding stuff generally high in fibre but low in its percentage of digestible matter as contrasted with that of concentrates. Hay, fodder and straw are common roughages.

rumen: The first and the largest of the four compartments which form the stomach of a ruminant; contains a large number of organisms which play an essential role in ruminant nutrition; it serves as a storage area for large quantities of feed, especially roughages, and has a capacity depending upon the size of the animals, of from 150 to 250 litres in mature cattle.

ruminant: Cud chewing animal, having four distinct compartments of stomach.

rumination (chewing the cud): Act of regurgitating food from rumen for chewing and mixing with saliva before returning it to the rumen.

S

SMP: Skimmed milk powder.

SNF: See solids-not-fat.

salt balance: In milk the ratio between calcium plus magnesium ions to phosphate plus citrate ions.

salt, dairy: Must contain 99.6 per cent (min) sodium chloride, free from visible impurities, not more than 0.03 per cent insoluble matter, and should not have more than 0.001 per cent of iron, 0.01 per cent of magnesium and 2 ppm of copper.

sandesh: Chhana based sweet, somewhat firm body, smooth texture.

sanitization: The use of methods and

materials to preserve or restore hygienic or healthful quality. In other words, to assure a hygienic product, sanitization must be maintained by the use of hygienic equipment by hygienic employees in hygienic surroundings.

sanitizing: Destroying pathogenic organisms but does not ensure complete removal.

Brings down their number within acceptable limits of hygiene. It is less expensive and less exacting and less time consuming than sterilizing.

score card: A numerical standard of excellence with definite values assigned for different aspects; a basis for judgement of a product or an animal.

sediment test: A simple, rapid and quantitative test to find gross impurities and dirt in milk due to unhygienic production, storage and transportation. However, there is no correlation between the amount of sediment and the bacterial content.

seed stockherd: Herd maintained for the purpose of producing breeding animals for use in commercial herd.

selection: Choosing animals to produce progenies which will contribute to next generation.

selection index: A system of weighing values of different traits to arrive at a single score for use in choosing animals to breed the next generation. The weights are generally determined on the basis of relative economic values, heritabilities, eg, genotype and phenotype correlations and other characters being combined.

semen: The fluid ejaculated by a male during coitus; contains sperm and secretions of accessory glands.

separator slime: It is a viscous mass which accumulates on the outer walls of the separator machine. This may accumulate to the extent that some of the openings are clogged, interfering with good operation. This slime consists of bacteria, leucocytes, enzymatic substances and other protein material as well as dirt.

serum of milk: The clear liquid obtained from milk, by removing the fat and casein. Whole milk without fat. It is commonly called whey.

service: The act of natural breeding in cattle.

sheath: The long tube in which the penis moves at the time of collecting semen for use in artificial insemination.

sherbet: A type of ice cream with low milk

solids about one per cent.

shrikhand: A sweet delicacy of Western India; prepared by sweetening dahi (curd). The curd is suspended in a muslin bag until nearly all the whey has drained off. Semi-dry mass is then whisked up with sugar, coloured and scented with saffron.

shrikhand wadi: Desiccated shrikhand for preservation and extended use. Dewatered curd worked with equal amount of sugar and dried in an open pan at low heat. When the mass begins to harden, it is flavoured, coloured and sugar is added. Mixed, rolled and cut into shapes and packed like biscuits.

silage: Is a high moisture (65-75 per cent) fermented forage (or other herbage) in fresh or wilted form preserved by anaerobic fermentation controlled by lactic bacteria.

silo: Under or above ground structure used for preserving feed or grains.

sire: Male parent.

sodium alginate: A vegetable product extracted from brown sea weeds (kelp), widely used as a stabilizer in dairy industry in ice cream, fermented milk, chocolate milk, etc, to improve the texture and the feel.

sodium caseinate: A hydrated casein product, made by the addition of sodium salts to calcium caseinate or cottage cheese curd.

soggy: A texture defect in ice cream due to lack of proper whipping or incorporation of air.

solids-not-fat (SNF): The percentage of total solids in dairy products minus the fat percentage. Solids-not-fat present in milk means the total solids minus butter fat.

sorbic acid: A permitted preservative used in cheese to the extent of 0.1 per cent, either as such or as its calcium, potassium and sodium salts.

soyabean milk: An imitation milk prepared from soyabeans.

sperm: Spermatozoon (pl Spermatozoa). The mature sexual cell produced in the testes whose function is the fertilization of the female egg cell.

spore: A vegetative or reproductive body of microscopic size produced by bacteria and fungi.

spray drying: A process of drying milk -- whole, condensed, skim or butter -- by spraying into chamber of heated air,

the temperature ranging from 250°F to 300°F. The heated air drives off the moisture and the solids fall to the bottom of chamber where powder is collected for packing.

stabilizers: Substances which stabilize milk against heat coagulation, eg citric acid, citrates, phosphates, carbonates, bicarbonates. Besides, these substances which make milk or cream more stable to heat, stabilizers like sodium alginate stabilizes the emulsion and give the desired improved texture to products. Only substances approved under the PFA Rules can be used in dairy products.

standard plate count: See total cell count.

starter culture: Microbial cultures producing lactic acid enzymes and other desired changes in milk and milk products.

stassanisation: A method of pasteurization of milk in a tubular heat-exchanger, consisting of three concentric tubes.

steer: Male calf castrated before sexual maturity.

sterile: In bacteriology, free from all living organisms. In animal husbandry, incapable of producing offspring.

sterility: Lacking the power to produce offspring.

sterilization: A process of freeing a commodity of living microorganisms. In relation to milk, sterilization is a process distinct from pasteurization in that milk is heated rapidly to very high temperature to destroy all life. As applied to dairy equipment, etc, sterilization refers to the process which destroys for all practical purposes most of the microorganisms.

still birth: The birth of a dead foetus, usually well advanced in development.

stomach: The main digestive organ, has four compartments in ruminants — rumen, reticulum, omasum and abomasum.

stover: Mature cured stalks of grain from which the ears have been removed, used as feed.

strainer: The material used for straining coarser particles from milk.

straining milk: Removal of coarse particles from milk by passing it through a number of materials as cheese cloth, cotton pad, etc.

straws: That part of the mature plant remaining after the removal of grains by thrashing or combing; it is a low nutritive cattle feed with poor protein content and highest crude fibre percentage.

strip: The last milk taken out of udder after the bulk of milk is drawn.

stripping: In hand milking of animals, the last few streams of milk drawn from each teat.

stunted: Arrested in growth or development; dwarfed; as a calf.

succulent: Soft, pliable, juicy feed relatively low in fibre content and easily digestible.

suck: To draw milk directly into mouth by creating vacuum with muscles of lips.

suckle: To suck milk at the udder.

syneresis of cheese curd: The process of expulsion of whey and contraction of the curd.

T

TDN: See total digestible nutrients.

tallowiness: A flavour defect in butter due to oxidation of unsaturated fatty acid, catalysed by traces of copper and oxidizing enzymes. It may be caused by exposure to air, light or heat, metals and metallic salts.

teat: The protuberance on the udder through which milk is drawn from a mammal. Cow has four teats, one for each quarter of the udder.

thermoduric bacteria: Organisms which grow optimally at temperatures from 120–160°F (50–60°C) and are able to survive temperatures higher than 176°F (80°C), but lie dormant until favourable growth temperature is reached. They often are cause of trouble in milk plants.

top cross: A cross in which superior or purebred individuals or breeds, usually males, are mated with inferior stock.

total cell count (standard plate count): The total number of bacteria or fungi both viable and non-viable in a sample of milk or dairy product; the number of organisms growing under specific laboratory conditions from one millilitre of milk. A count of 50,000 is considered microbiologically good.

total digestible nutrients (TDN): A term in animal feeding which designates the sum of all the digestible organic nutrients — protein, fibre, nitrogen-free extract and 2.25 times the fat in a feeding stuff. The fat is multiplied by 2.25 as its energy value is about 2.25 times of

carbohydrates. The abbreviation, TDN, is frequently used instead of the full term.

total dry matter: Dry matter in feed is weight of feed minus water removed by oven drying. Percentage of dry matter is found by ascertaining the percentage of water and subtracting this from 100 per cent.

tuberculin test: A test for detection of past or present tuberculosis infection in an animal. It is accomplished by the inoculation of tuberculin, a sterile liquid containing the growth products of tubercle bacilli into the animal and an interpretation of the results according to the hypersensitivity reaction.

tuberculin tested milk (TT Milk): Milk derived solely from a herd of tuberculin tested animals and kept pure and unmixed with other non-TT milk.

U

UHT (Ultra High Temperature): UHT treatment is a technique for preserving milk and other liquid food products by exposing them to brief, intense heat to temperatures in the range of 135-140°C (275-285°F). This process destroys all microorganisms present in the products. In Europe and America, UHT is accepted as the most effective treatment for milk preservation. UHT treatment is a continuous process which takes place in a closed system to prevent the product from getting contaminated by airborne microorganisms. The product passes through heating and cooling stages in quick succession. Aseptic packaging to prevent reinfection of the product is an integral part of the process. Two alternative methods of UHT treatment are practised: Indirect heating and cooling in heat exchangers (normally of plate type); Direct heating by injection of steam and cooling by expansion under vacuum.

udder: The mammary gland or milk gland of mammals. In the cow the udder is composed of four mammary glands with four teats, one for each quarter. The udder in a well developed dairy cow is attached well in front and has a rounded appearance, with attachments extending

high behind. It ordinarily is soft and pliable.

ultrafiltration (UF): A separation process using a membrane with extremely fine pores, only 1-20 nano-metres (millionth of a millimetre) in diameter. Small and simple molecules like water and dissolved salts can be forced through the pores under pressure, but larger and more complex molecules such as proteins and fats cannot get through. A process stream passing over a UF membrane is separated into two fractions. The low-molecular fraction that passes through the membrane is called the permeate or ultrafiltrate, and the highmolecular fraction is called the retentate or concentrate. The most common applications in the dairy industry are: (a) concentration of milk as a preliminary step in production of various dairy products; (b) concentration of whey to recover whey proteins. Also referred to as membrane processing or reverse osmosis (RO).

uperization: Sterilizing milk by direct injection of steam.

urea: White crystalline organic compound; the end product of protein and amino acid metabolism in animals. The principal nitrogen compound secreted in urine.

uric acid: A non-protein nitrogenous substance present in milk to the extent of 10-20 mgm per litre.

uterus: The womb; a hollow, muscular organ in the female genital tract into which embryo develops from the time of conception to birth.

V

vaccination: A practice of artificially building up body immunity against specific infectious disease through inoculation with a specific antigen.

vaccine: Biological agent or an antigen (substances from organisms) which consists of a live, non-virulent or attenuated or dead bacterium or virus and is administered to produce or artificially increase immunity to a particular disease.

vacreation: Pasteurization of milk/cream under reduced pressure by direct steam.

vector: In biology, any agent, but usually an insect, which is a carrier of a disease producing microorganism which it

transmits from animal or plant to another, thus spreading disease.

vegetable toned milk: Milk protein of skim milk powder is substituted by vegetable protein isolated from groundnut.

vitamin D enriched milk: Milk rich in vitamin D, obtained from animals fed on irradiated yeast.

vulva: The external opening of the vagina of a female animal.

W

water buffalo: See buffalo.

weaning: To accustom young calves to take feed otherwise than by suckling.

whey: The serum or watery part which is separated from the curd after milk is coagulated for cheese making. It contains the milk sugar, whey proteins and minor amount of fat and other soluble constituents of milk.

whey protein concentrate: Soluble and coagulated whey protein; good protein source in baking, baby foods, beverages, ice cream, emulsifying/whipping agent.

whipping cream: Refers to beating of cream to produce froth or foam. A special foam, possessing remarkable stability, used in cakes, ice creams, etc for decorative purpose; contains 30-40 per cent fat.

whole milk powder: When water is removed from milk, dried whole milk is the resultant product. Such a product must have at least 26 per cent milk fat and not more than 5 per cent moisture.

Y

yak: A wild or domesticated species of ox (Bos grunniens) of the high plateaus and mountains of Tibet and Central Asia, covered with a thick coat of long silky hair, that of the lower parts hanging down almost to the ground.

yield: To produce or give forth. In relation to dairy, milk produced by an animal per day, lactation or year; Quantity of resulting milk product.

yoghurt: A fermented, slightly acid semi-fluid milk product made of skimmed milk

and milk solids to which culture of two bacteria (Lactobacillus bulgaricus and Streptococcus thermophilus) are added. Yoghurt is considered to repress undesired bacteria in the bowels.

Z

zebu (Bos indicus): One of the two principal types of dairy and beef cattle of India, China and other southeastern Asiatic regions and Southeastern Africa, is characterized by the prominent hump over the withers, short horns, large drooping ears, very large dewlap, large navel flap, short stiff hair, loose vascular skin, loose body build — all features evolved to facilitate heat loss. They also are more resistant to tropical insects and diseases. Zebu's milk, like buffalo's is high in fat and milk solids. There are a number of Zebu breeds varying in colour from grey, the predominant colour of the Brahman breed, to cream, white and even black and mixtures of black and white.

zoonosis: Any disease communicable from one animal to another or to man; a disease due to animal parasites, such as rabies.

zurpi: The name given to sun-dried butter-milk in Nepal and known as "kurud" in Afghanistan; keeps well for years because of its high content of lactic acid and low moisture content; noted for amazingly high digestibility of proteins. A good example of traditional milk concentrate which "naturally" preserves the goodness of milk.

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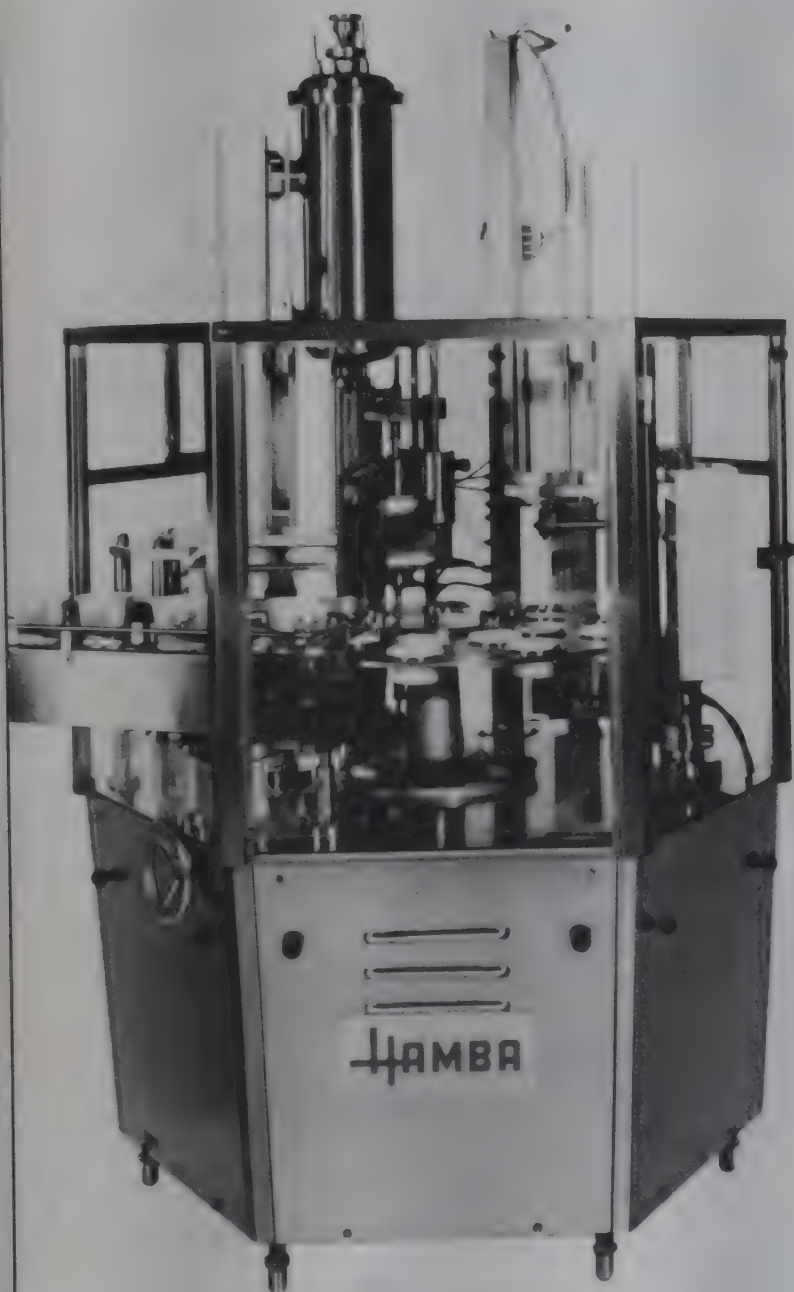
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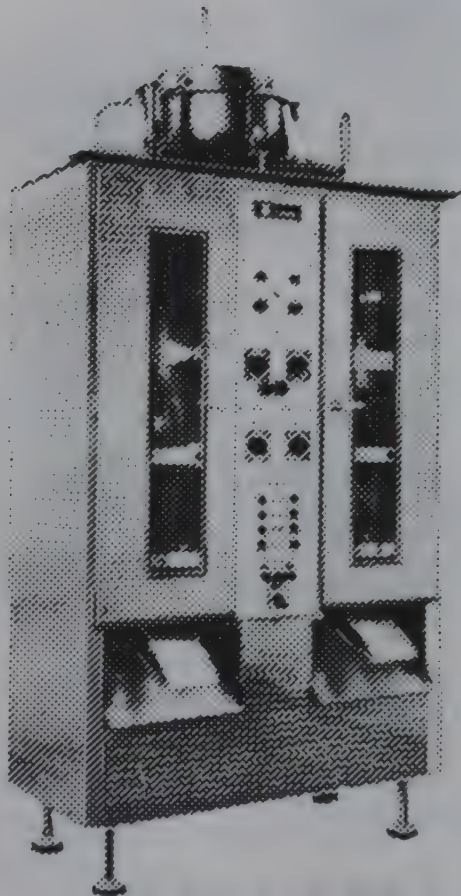
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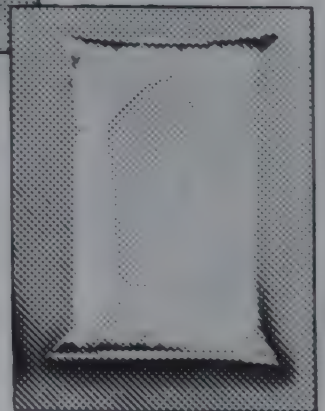
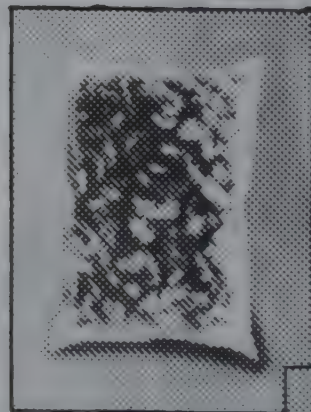
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Listed below regionwise are laboratories offering facilities for testing milk and its products and/or cattle feed. Included are four Central Food Laboratories set up in the four regions by Government of India under the Prevention of Food Adulteration Act (PFA) to function as an appeal and reference laboratory for analysis of food samples in case of disputes, and the certificate of analysis issued by them supercedes the report of earlier analysis. Excluded are Dairy Science Colleges and agricultural universities and their constituent colleges which also provide these testing facilities.

Northern Region

ANALYTICAL TESTING SERVICES PVT LTD, Dr Jha Marg, Okhla, New Delhi 110020; Ph: 633567, Gram: Testlab; Mg Dir: Parvinder Singh; Quality Assurance Mgr: Santosh Yellore.

CENTRAL FOOD LABORATORY (GOI), c/o Food Research & Standardization Laboratory, Navyug Market, Ghaziabad 201001, Ph: 4197; Dir: P K Dhingra.

DELHI ADMINISTRATION FOOD LABORATORY, Opp Civil Lines Police Station, Sharnath Marg, Delhi 110054; Ph: 223894. Public Analyst: Dr A R Nikam.

DELHI TEST HOUSE, Old Rationing Office Bldg, 9/7 Shakti Nagar, Delhi 110007; Ph: 7125509, 7117327; Partners: M C Goel, Ph (resi): 2518354, G D Goel, Ph (resi): 230078.

GOVT OF HARYANA STATE FOOD, WATER & EXCISE LABORATORY, Sector 11, Chandigarh.

GOVT OF HIMACHAL PRADESH STATE FOOD LABORATORY, Kandaghat, Solan Dist.

GOVT OF JAMMU & KASHMIR FOOD LABORATORIES — Jammu-Tawi: Canal Rd; Srinagar: Near C D Hospital, Drugjan.

GOVT OF KERALA, Dte of Dairy Development — Quality Control Offrs — Alleppey: G Raveendran Nair; Ernakulam: George Sen; Kozhikode: Tony Michael; Malappuram: R Balasubramaniam; Quilon: V R Krishnan; Trivandrum: S Sivasankaran Nair.

GOVT OF MADHYA PRADESH COMBINED FOOD & DRUGS LABORATORY, Idgah Hills, Bhopal; Food Laboratories — Indore: M G M Medical College Compound; Jabalpur: Civil Surgeon Office Compound; Raipur: Medical College Compound; Rewa: Civil Surgeon Office

Compound. Public Health Laboratories — Bilaspur; Gwalior: G B Medical College. Municipal Health Laboratories — Municipal Corporation of Bhopal, Indore, Jabalpur, Ujjain.

GOVT OF PUNJAB STATE PUBLIC ANALYST, I/c Punjab State Food Drugs & Excise Laboratory, Sector 11, Chandigarh 160011; Ph: 29788. Dist Public Health Laboratories — Bhatinda: Old Civil Hospital; Jalandhar: Nehru Garden.

GOVT OF RAJASTHAN STATE PUBLIC HEALTH LABORATORY, Mandir Marg, Sethi Colony, Near Mental Hospital, Jaipur. Regional Public Health Laboratory, C-27 Railway Rd, Jodhpur. Public Health Laboratories — Ajmer, 106/10 Civil Line; Alwar; Banswara; Bharatpur; Bhilwara; Bikaner: P B M Hospital Premises; Dungarpur; Sri Ganganagar; Jhalwara; Kota: Nayapura; Sikar: S K Hospital; Tonk; Udaipur.

GOVT OF UTTAR PRADESH PUBLIC HEALTH LABORATORIES — Lucknow: University Campus; Varanasi: Maqbool Alam Rd, D I G Colony.

HARYANA STATE DAIRY LABORATORY, Rohtak; Ph: 2869; Mgr, Quality Control: S P Singh.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Izatnagar 243122, Bareilly Dist, UP; Ph: 74171, Gram: Vetex; Anim Nutrition Div, Head: Dr Kedar Nath.

LIVESTOCK FIELD INVESTIGATION STATION, Govt of Rajasthan, Bassi 303301, Jaipur Dist; Ph: 27; Offr Incharge: Dr A K Purohit; Animal Nutritionist: Dr S K Maheshwari.

NATIONAL DAIRY RESEARCH INSTITUTE, Karnal 132001; Gram: Dairysearch. Div of Dairy Cattle Nutrition & Physiology, Head: Dr B N Gupta, Ph: 2832; Dairy Chemistry Div, Head: Dr M K Jain, Ph: 2840.

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ANIMAL NUTRITIONAL RESEARCH CENTRE, Aarey Milk Colony, Bombay 400065; Dep Dir of AH (Quality Control): Dr V E Nikumbh.

CENTRAL FOOD LABORATORY (GOI), c/o State Public Health Lab, Stavely Rd, Pune 411001; Ph: 22658, Gram: Publab; Dir: A G Lakhani, Ph: 24341, resi: 25669.

CHEM-MED ANALYTICAL LABORATORIES (CMA), 5-6-7 Kakad Estate, Seaface Rd, Worli, Bombay 400018; Ph: 4937942; Mg Partner: J L Sipahimalani; Chief Chemist: A H Karnachi.

GEO-CHEM LABORATORIES PVT LTD, 294 Shahid Bhagat Singh Rd, Bombay 400001; Ph: 263153, 268544, 265217, Gram: Geochemsup, Tlx: 011-73510; Dir: Dinesh Bahl. Branches: Bellary, Calcutta, Cochin, Goa, Jamnagar, Kakinada, Kandla, Madras, New Delhi, Rajkot, Visakhapatnam.

GOVT OF GOA COMBINED FOOD & DRUG LABORATORY, Dte of Health Services, Campal, Panaji.

GOVT OF GUJARAT — (1) Food & Drugs Laboratory, Near Polytechnic, Baroda 390005; Ph: 67211-12; (2) Regional Food Laboratory, Bhavnagar Utara, Rajkot 360001; (3) Public Health Laboratory, Civil Hospital Compound, Bhuj (Kutch).

GOVT OF MAHARASHTRA FEED ANALYTICAL LABORATORY, c/o Wool Research Centre, Sheep Breeding Farm, Gokhalenagar, Pune 411016; Ph: 54862.

GOVT OF MAHARASHTRA STATE PUBLIC HEALTH LABORATORY, Stavely Rd, Pune 411001; Ph: 24341, 22658; Dir: A G Lakhani. Regl Public Health Labs — Aurangabad Cantonment, Nizam Bungalow; Nagpur 440022; Shradhanand Peth. Dist Public Health Labs — Amravati; Jalgaon 425001: Near New Shirdi Naka, Opp Bapoo Nagar; Kolhapur: 120 Shahu Market Yard; Nanded 431602; 114 Ganesh Nagar Housing Soc; Nashik: Distillery Barrack No 15, Nashik Rd; New Bombay 400614; Room No 34, 3rd Floor, (Vashi),

Konkan Bhawan; Sangli: Indl Estate Coop Soc, Mahadeo Nagar; Solapur 413001: 55 Railway Lines, Gadgil Bungalow; Municipal Laboratories — Bombay 400028: Centralised G/North Wards, Offices Bldg, 2nd Floor, Room No 49, J K Sawant Marg, Dadar; Nagpur: Nagpur Municipal Corpn, Mahanagar Palika Marg.

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Southern Region

CENTRAL FOOD LABORATORY (GOI), c/o Central Food Technological Research Institute, Analytical Quality Control Laboratory (AQCL), Cheluvamba Mansion, Mysore 570013; Ph: 22660, Gram: Foodsearch, Tlx: 846-241 FTRI; Dir: Dr B L Amla.

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NATIONAL DAIRY RESEARCH INSTITUTE (NDRI), Southern Regional Station, PO Adugodi, Bangalore 560030; Ph: 575119, Gram: Dairysearch; Head: Dr S R Sampath.

REGIONAL RESEARCH LABORATORY, Hyderabad 500007; Ph: 71992, Gram: Research, Tlx: 0155-6261; Dir: Dr A V Rama Rao; Scientist: Mrs J Swaminathan.

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CENTRAL FOOD LABORATORY (GOI), 3 Kyd St, Calcutta 700016; Ph: 240119, Gram: Cenfoodlab; Dir (Actg): Dr K C Guha, Ph: 248896, 240119.

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ALL INDIA ICE CREAM MANUFACTURERS ASSOCIATION, 29 Hanuman Rd, New Delhi 110001; Ph: 311160, 311163; Pres: P L Lamba; Hon Sec: G D Chaudhari.

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ASSOCIATIONS OF FOOD SCIENTISTS & TECHNOLOGISTS (INDIA), CFTRI Campus, Mysore 570013; Ph: 21747, Gram: Foodsearch, Tlx: 846-241 FTRI IN; Pres: Dr V H Potty; Vice Pres: Dr A M Nanjundaswamy; Hon Exec Sec: Dr T S S Rao; Hon Jt Sec: N Keshava; Hon Treasurer: Dr K Sambaiiah; Hon Editor: Dr N Chandrasekhara; Pres designate: N A Pandit.

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DAIRY HERD IMPROVEMENT ASSOCIATION (DHIA), 6 Viswesvarapuram, Madras 600018; Ph: 77444; Hon Sec: Prof M E Doraiswamy. Publication: Milcow.

INDIAN ASSOCIATION OF LADY VETERINARIANS (IALV), B-104 Kaveri Apts, Kalkaji, New Delhi 110019; Ph: 6433421; Pres: Dr (Mrs) P Padmavathi; Vice Pres: Dr (Mrs) T S Nalini; Sec: Dr (Mrs) Thankam Mathew.

INDIAN DAIRY ASSOCIATION, IDA House, Sector IV, R K Puram, New Delhi 110022; Ph: 670781, 674719, Gram: Dairyman; Pres: B P S Puri; Vice Pres: Dr T P Ojha, Dr N C Ganguli; Sec: Dr E Madhavan; Treasurer: R P Banerjee; Chief Editor: Dr B K Chakraborty; Members; Exec Cttee: D V Chowdhary, K Murugesan, A K Ray Chaudhuri, Dr J S Punjraath, M Balan, H K Singh Walia, Dr G S Rajorhia, Dr S P Arora, Dr R Nagarcenkar, Rajeev Verma; Representing Zonal Branches — South: Dr S R Sampath; West: N D Kotnis; North: A Banerjee; East: Dr R S Gill; Past Sec: D Tikku; Chief Administrative Offr: K Altaf. Branches — South Zone: IDA House, c/o SRS of NDRI, Adugodi, Bangalore 560030; East Zone: c/o NDDB, Block DK, Sector II, Salt Lake City, Calcutta 700091; West Zone: c/o Indian Dairy Corp'n, Raj Mahal Bldg, 6th Floor, 84 Veer Nariman Rd, Bombay 400020; North Zone: 204 Azad Market, Delhi 110006. Publications: Indian Dairyman, Indian Journal of Dairy Science, Dairying in India.

INDIAN NATIONAL COMMITTEE OF THE INTERNATIONAL DAIRY FEDERATION, NDDB Campus, PB No 40, Anand 388001, Gujarat; Ph: 3002 to 3011, Gram: Dairyboard, Tlx: 0172-207; Chmn: Dr V Kurien; Sec:



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INDIAN ONGOLE CATTLE BREEDERS ASSOCIATION, 9th Street, A T Agharam, Guntur 522004, Andhra Pradesh; Ph: 25473; Pres: M Nardndra Nath; Sec: Dr V Anjaneyalu.

INDIAN SOCIETY OF ANIMAL GENETICS AND BREEDING, Room No 109, Krishi Bhawan, New Delhi 110001; Ph: 382545; Pres: Dr R M Acharya. Publication: Indian Journal of Animal Genetics and Breeding.

INDIAN SOCIETY OF ANIMAL PRODUCTION & MANAGEMENT (ISAPM), Dept of Anim Production, Orissa Univ of Agri & Tech, Bhubaneswar 751003; Ph: 52919-68, Gram: Agritech; Pres: Dr M Mishra; Vice Pres: Dr N N Bora, Dr J B Nayak; Sec Gen: Dr J Mohanty; Chief Editor: Dr R N Pal; Editor: Dr N S R Sastry; Members, Central Exec Cttee: Dr B K Dave, Dr R A Singh, Dr C K Thomas, Dr S C Gupta and Dr R R Rout. Publication: Indian Journal of Animal Production and Management.

INDIAN SOCIETY FOR THE STUDY OF ANIMAL REPRODUCTION, THE, Veterinary Polyclinic, Opp Nirlon, Western Express Highway, Goregaon (East), Bombay 400065; Ph: 692768, 692637, Gram: Bovet; Pres: Dr B R Deshpande; Vice Pres: Dr A S Kaikini; Hon Sec: Dr D P Velhankar; Jt Sec: Dr M L Madan; Hon Treasurer: Dr V L Deopurkar; Publication Editor: Dr S B Kodagali; Patron: Dr C R Sane. Publication: Indian Journal of Animal Reproduction.

INDIAN VETERINARY ASSOCIATION, No 123, 7th Main Rd, IV Block (West), Jayanagar, Bangalore 560011; Ph: 641200; Pres: Dr C Krishna Rao; Gen Sec: Dr S Abdul Rahman; Jt Sec: R R N Patnaik; Treasurer: Dr B C Ramakrishna.

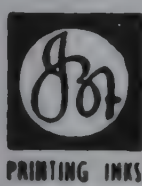
STATE VETERINARY ASSOCIATIONS -- Assam: c/o College of Vet Sc, Assam Agril Univ, Khanapara, Guwahati 781022; Gen Sec: Dr G P Patgiri; Bihar: Bihar Vet Assn, Inst of Animal Health and Production, Patna 800014; Gen Sec: Dr Biresh Prasad Sinha; Delhi: Delhi Vet Assn, Tis Hazari Vet Hospital, Delhi 110054; Gen Sec: Dr R V Sharma; Goa: Goa Vet Assn, Directorate of AH & Vet Services, Ganga Niwas, Panaji 403001; Gen Sec: Dr V J Thomas; Gujarat: Gujarat Vet Assn, Directorate of Animal Husbandry, Krishi Bhavan, Ahmedabad 380001; Pres: Dr R N Jetly; Haryana: Haryana State Vet Assn, Vet Hospital, Narvana, Dist Jind; Gen Sec:

Dr Swarn Singh Bamel; Himachal Pradesh: HP Vet Assn, Office of Dist Vet & AH Off, Kangra, Dharamshala 176215; Pres: Dr P S Sen; Gen Sec: Dr R K Shukla; Jammu & Kashmir: J & K Vet Assn, Poultry Marketing Off, Belicharnova, Jammu Cantt 180003; Pres: Dr B L Sharma; Gen Sec: Dr P P Singh; Karnataka: Karnataka Vet Assn, 140 Golden Jubilee Eldg, 8th Cross, Malleswaram, Bangalore 560003; Pres: Dr S Abdul Rahman; Gen Sec: Dr B C Ramakrishna; Kerala: Association Bldg, T C No 25/1324 Dharmalayan Rd, Trivandrum 695001; Pres: Dr K R Rajan; Gen Sec: Dr George Varghese; Madhya Pradesh: MP Vet Assn, c/o Vet Hospital, Ujjain 456001; Gen Sec: Dr N K Nagar; Maharashtra: c/o Inst of Vet Biological Products, Ganesh Khind Rd, Aundh, Pune 411007; Gen Sec: Dr R T Wazarkar; Manipur: All Manipur Vet Doctors Assn, Sanjehthong, Imphal 795001; Gen Sec: Dr M Yed Hachandra Singh; Meghalaya: Meghalaya Vet Assn, Shillong 793001; Gen Sec: Dr D Lyngdoh; Mizoram: Mizoram Vet Assn, Directorate of Vet Services, Aizwal 796001; Gen Sec: Dr Daniel Chianghnuna; Nagaland: Nagaland State Vet Assn, Directorate of Vet Services, Kohima 797001; Pres: Dr L Sorhie; Pondicherry: Pondicherry Vet Assn, Animal Husbandry Complex, Pondicherry 605001; Sec: Dr N Karthikayan; Rajasthan: Rajasthan Vet Assn, No 80 Pratap Nagar, Tonk Rd, Jaipur 302015; Pres: Dr K C Banwari; Sikkim: Sikkim Vet Assn, Dept of AH & Vet Sc, Vet Complex, Deorali, Gangtok 737101; Gen Sec: Dr P P Sharma; Tamil Nadu: Tamil Nadu Vet Assn, No 16, Crescent Rd, Kottur Gardens, Madras 600085; Pres: Dr S Rangaraj; Sec: Dr V Satchidanandam; Tripura: Tripura Vet Assn, Abhoynagar, Agartala 799005; Pres: Dr A J Majumdar; Uttar Pradesh: UP Vet Assn, Directorate of AH & Vet Services, Badshahbagh, Lucknow 226007; Sec: Dr (Mrs) Gayathri Sharma; West Bengal: No 37 Belgachia Rd, Calcutta 700037; Gen Sec: Dr D M Pandey. Publication: Indian Veterinary Journal.

MAHARASHTRA CATTLE BREEDERS ASSOCIATION, Shinde Bungala, Shrirampur 413709, Dist Ahmednagar; Ph: 796; Pres: Annasahib P Shinde.

ORGANISATION OF PHARMACEUTICAL PRODUCERS OF INDIA, Cook's Bldg, 1st Floor, 324 Dr D N Rd, Bombay 400001; Ph: 2045509, 2044518, Gram: Oppind, Tlx: 011-3880

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PERFUMERY & FLAVOURS ASSOCIATION OF INDIA (PAFAI), 2-B Court Chambers, 35 Sir Vithaldas Thackersey Marg, Bombay 400020; Ph: 295875; Pres: Padam K Seth; Hon Sec: Avinash K Marathe; Treasurer: Ashit M Patel.

PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA, Mahalaxmi Chambers, 22 Bhulabhai Desai Rd, Bombay 400026; Ph: 4928858, Gram: Proteins; Exec Dir: Dr C L Nagarsekar.

SOCIETY FOR THE ADVANCEMENT OF RESEARCHES IN ANIMAL SCIENCES (SARAS), Dept of Animal Sciences, Punjab Agril Univ, Ludhiana 141004; Pres: Dr M S Tiwana; Vice Pres: Dr G S Makkar; Sec: Dr O S Parmar; Treasurer: Dr M L Kansal; Mems: Dr J S Sandhu, Dr B K Shingari, Dr J R Kaushal, Dr O P Takkar. Publication: SARAS Journal of Livestock & Poultry Production.

WEST GODAVARI CATTLE BREEDERS ASSOCIATION, Tanuku 534211, Andhra Pradesh; Ph: 2099; Sec: M Narendra Nath.

Foreign

ANIMAL PRODUCTION AND HEALTH COMMISSION FOR ASIA, THE FAR EAST AND THE SOUTH-WEST PACIFIC (APHCA), APHCA Secretariat, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Rd, Bangkok 10200, Thailand. FAO/APHCA Executive Committee — Chmn: Dr Giam Choo Hoo; Vice Chmn: Dr J A de S Sriwardene; Members: Dr Ahmad Eghtessad, Dr A Mustafa Babjee, Dr Carme E Caspe; Secretary: Dr B K Soni.

INTERNATIONAL DAIRY FEDERATION (IDF), Square Vergote 41, B-1040 Brussels, Belgium; Ph: (02) 733-98-88, Gram: Dairy Federation, Brussels, Tlx: 63818 IDFFIL. Executive Committee — Pres: W M Dijkstra (Netherlands); Vice Pres: Dr J Gabriel (Czechoslovakia), R Westernacher (West Germany); Mems: S J Al Windawi (Iraq), J G Becue (France), B Dock

(Sweden), Dr G A Eresiko (USSR), G M Farnham (USA), R P Francis (England), B D Hannaford (Australia), A Hellemans (Belgium), T Higaki (Japan), B Oterholm (Norway), Dr S Szakaly (Hungary), A Tirs-gard (Denmark). President of the Commission of Studies: Dr E J Mann, Chauncerie, 97 High St, Wargrave, Reading RG10 8DD, England. Sec Gen: P Staal.

ANALYTICAL LABORATORIES

(Continued from page 313)

GOVT OF ASSAM FEED ANALYSIS LABOARATORY, Khanapara, Guwahati 781022; Ph: 87370; Physiological Chemist: Mrs M Moral.

GOVT OF ASSAM STATE PUBLIC HEALTH LABORATORY, Bamunimaidan, Guwahati 781021.

GOVT OF BIHAR FOOD DRUG LABORATORY, Agam Kuan, Patna. Food Laboratories — Bhagalpur: Bhagalpur Medical College Hospital; Dhanbad: c/c Public Health Lab, Jharia Mines Board of Health; Hazaribagh: Sadar Hospital; Muzaffarpur: Sadar Hospital; Ranchi: Sadar Hospital; Saharsa: Sadar Hospital.

GOVT OF NAGALAND STATE PUBLIC HEALTH LABORATORY (Food Laboratory), Kohima; Offr In-charge: Dr Sashimeren Aier.

GOVT OF ORISSA STATE PUBLIC HEALTH LABORATORY, Satyanagar, Bhubaneswar.

GOVT OF TRIPURA STATE PUBLIC HEALTH LABORATORY, Agartala 799001; Ph: 1301, Gram: Public Analyst; Public Analyst: P K Roy.

GOVT OF WEST BENGAL CENTRAL PUBLIC HEALTH & DRUG LABORATORY, 2 Convent Lane, Calcutta 700015. Asansol Mines Board of Health Laboratory, Asansol. Dist Diagnostic & Public Health Laboratories — Berhampur; Birbhum: PO Suri; Jalpaiguri; Kalyani: Public Health Laboratory, T B Hospital, PO Kanchrapara. Municipal Corporation of Calcutta, Central Laboratory, 1-A Hogg St, Calcutta 700013.

INDUSTRIAL RESEARCH LABORATORY, Govt of West Bengal, Canal South Rd, Pagladanga, Calcutta 700015; Ph: 244632.

NATIONAL TEST HOUSE, Dept of Commerce, Civil Supplies & Cooperation, Govt of India, 11/1 Judges Court Rd, Calcutta 700027; Ph: 459231.

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- Sabarmati Ashram Gaushala was founded by Mahatma Gandhi in 1915. It has developed into an advanced centre for animal husbandry activities.
- The bull mother farm can supply high pedigreed Holstein, Jersey, Kankrej and Crossbred bulls, Bull calves and heifers.
- The Gaushala's sperm station can supply good quality frozen semen doses of high pedigreed Holstein, Jersey, Crossbred, Kankrej, Gir and Buffalo breeds in French medium straws. Gaushala can supply good quality fodder seeds. Training programmes in animal husbandry, frozen semen handling, Embryo Transfer Technology and Fodder Production can be arranged on request.



For further information on the above matters, please contact:

General Manager

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Bidaj Farm

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Phones: 80-14 (Bareja Exchange) ● 407088 (Ahmedabad)

Gram: GAUSHALA, Ahmedabad 380027

Breeding Farms

Breeding farms for cattle and buffaloes, covering indigenous, exotic and crossbred as well as bull mother farms are listed below, regionwise. The breeds maintained and their herd strength, with reference to the number of females (F) and males (M), have also been indicated, wherever possible.

Northern Region

DELHI

INDIAN AGRICULTURAL RESEARCH INSTITUTE,
Pusa, New Delhi 110012; Dairy Section
Estd: 1905; Offr Incharge: Dr Gurcharan
Singh, Ph: 582081, 584266 (resi). Breeds:
Holstein-Friesian, Friesian x Sahiwal,
Jersey bulls, Sahiwal. India's oldest
Sahiwal herd maintained. Extension acti-
vities undertaken. Herd Size: 150.

HARYANA

CENTRAL INSTITUTE FOR RESEARCH ON BUFFALOES,
Sirsa Rd, Hisar 125001; Ph: 4510, Gram:
Bubalindex, Tlx: 0345-204 CIRB IN; Dir:
Dr V D Mudgal, Ph (resi): 4488; Farm
Supdt: Dr Rohtas Singh, Ph: 4170; Div of
Breeding & Statistics, Head: Dr A K
Chakravarty, Ph: 5147; Scientist: Dr S S
Sengar. Breed: Murrah. Research: AICRP
on Buffaloes.

GOVERNMENT LIVESTOCK FARM, Govt of Haryana,
Hisar 125001; Ph: 4197, 2317, Gram: Cattle
Farm; Chief Supdt: P K Gupta, IAS, Ph:
2317; Farm Supdt, Sector I: Dr S S Talwar;
Farm Supdt, Sector II: Dr V K Bhatnagar,
Ph: 3814; Vet Surgeons: Dr J P Nautiyal,
Dr M S Rana, Dr Jagdeep Malik, Dr R S
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(407), Tharparkar (244). Superior pedi-
greed bulls supplied throughout the
country.

HARYANA AGRICULTURAL UNIVERSITY, ICAR Pro-
ject Directorate on Cattle Improvement,
Hisar 125004; Ph: 3721, Gram: Agrivar-
sity; Chief Scientist (AB): Dr S C
Chopra. Breeds: Crossbreds of Holstein-

Friesian and Jersey with Haryana. Herd
Strength: F 100 plus followers.

INDO-AUSTRALIAN CATTLE BREEDING FARM, Hisar
125001; Proj Dir: Dr M L Bhutani, Ph:
2836. Breeds: Holstein-Friesian, Jersey
and Crossbreds, M 20, F 913.

MODEL EXOTIC ANIMAL FARM, Haryana Dairy
Development Cooperative Federation Ltd,
Bhiwani 125021; Ph: 2422, Gram: Vitality;
Proj Mgr: Dr R S Jhas; Agronomist: V K
Sikka. Breeds: Holstein-Friesian, Jersey,
Haryana, Murrah, Sahiwal.

NATIONAL DAIRY RESEARCH INSTITUTE (NDRI),
Karnal 132001; Ph: 4293, Gram: Dairy-
search, Tlx: 0396-204 NDRI; Estd: 1923;
Dir: Dr R Nagarcenkar, Ph: 4293, resi:
4291; Dairy Cattle Genetics & Breeding
Div, Head: Dr M Gurnani; Incharge Cattle
Yard: Dr Q S Tomer. Breeds -- Holstein-
Friesian (2), Karan-Fries (501), Karan-
Swiss (467), Red Sindhi (5), Sahiwal
(114), Misc Group (9); Buffaloes: Murrah
(396), Goats: 224.

SATGURU HARI SINGH CATTLE BREEDING FARM,
Jivan Nagar, Hisar. Breed: Haryana.

SHREE GAUSHALA TRUST, Bhiwani 125021; Ph:
2529, 2530, 2533; Estd: 1883; Vice-Pres:
Ram Bhajan Aggarwal, Ph: 2251-2; Hon Mgr:
Devki Nandan, Ph: 2540; Sec: Suraj Bhan
Bagria; Jt Sec: Ganpat Rai Mindooka, Ph:
3507. Breeds: Crosses of Jersey, Holstein-
Friesian. Herd Strength: 1,030.

SHRI GAUSHALA SOCIETY (FEGD), G T Rd, Pani-
pat 132103; Estd: 1905; Pres: Dalip Singh
Arya, Ph: 2360; Mgr: Ram Gopal, Advocate,
Ph (resi): 2775. Breeds: Holstein, Jersey,
Haryana, Sahiwal. Herd Strength: 221.

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 Holstein-Friesian, Jersey. Kotlipura,
 Dist Bikaner: Estd: 1968. Breeds:
 Holstein-Friesian, Jersey.

INDO-CLIPPA CATTLE BREEDING FARM, Bikaner,
 175021, Dist Mandi; Ph: 39; Estd: 1964;
 Offr Incharge: Dr S P Behl. Breeds:
 Holstein-Friesian (33), Jersey (3).

INDO-NEW ZEALAND PROJECT, c/o Himachal Pra-
 desh Agril Univ, Palampur 176071. Breed:
 Jersey.

JERSEY CATTLE BREEDING FARMS — Yarega
 171304, Dist Mandi: Breeds: Holstein-
 Friesian, Jersey; Palampur 176061, Dist
 Kangra; Estd: 1963. Breeds: Holstein-
 Friesian, Jersey.

MILITARY FARMS — Dehra 173218: Herd: F
 126; Dalhousie 176305: Herd: F 60.

JAMMU & KASHMIR

GOVERNMENT OF JAMMU & KASHMIR, AH Dept; Cat-
 tle Breeding Farms — Bell Charana: Jammu
 Cantt; Estd: 1954. Breeds: Jersey, Murrah,
 Sahiwal, Budni; Mamhal, Dist Srinagar:
 Estd: 1977. Breed: Jersey.

MILITARY FARMS — Srinagar: Herd Strength,
 F 78.

PUNJAB

AMRITSAR PINURAPOLE CAUSHALA (REGD), Ghee
 Mandi, Amritsar 143006; Ph: 46813; Estd:
 1963; Pres: Surinder Chand Mehra, Ph:
 43318; Gen Sec: Manmohan Lal Singhania,
 Ph: 46401. Breed: Sahiwal (600).

GOVERNMENT OF PUNJAB, AH Dept; Cattle Breed-
 ing Farms — Mattewara, Ludhiana: Estd:
 1973. Breed: Holstein-Friesian; Nabha
 147201: Estd: Pre-1947. Breeds: Brown
 Swiss, Holstein-Friesian, Sahiwal and
 crosses; Patiala: (i) Bhupindra Dairy
 Farm; Estd: Pre-1947. Breeds: Brown Swiss,
 Holstein-Friesian, Sahiwal and crosses;
 (ii) Buffalo Breeding Farm. Breed: Murrah;
Ropar: (i) Jersey Cattle Breeding Farm;
 Estd: 1973. Breed: Jersey; (ii) Sutlej
 Bed Bet Farm; Estd: 1976. Breed: Holstein-
 Friesian.

MILITARY FARMS — Binsarawal: Herd Strength,
 Cows: 356; Perozepur: Herd Strength, Cows:
 142, Buffaloes: 373; Jalandhar: Herd
 Strength, Cows: 669.

PUNJAB AGRICULTURAL UNIVERSITY, All India
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 Breeding, Ludhiana 141004; Sr Anim Gene-
 ticist: Dr M S Tiwana; Asst Endocrino-
 logist: Joga Singh; Asst Anim Health
 Specialist: Dr S S Sidhu; Asst Anim Gene-

ticist: Dr M S Bhullar; Asst Physio-
 logist: Narinder Singh; Statistician:
 Dr B S Arora. Breeds: Murrah, Nili Havi
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 (Khanna) 141401, Dist Ludhiana; Ph: 20959;
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 Holstein-Friesian, M 6, F 48; Jersey, M
 10, F 19; Murrah, M 4; Nili Havi, M 15.
 SUTLEJ BED BET FARM, Ropar.

RAJASTHAN

CENTRAL CATTLE BREEDING FARM (GOI), Surat-
 garh 335804; Ph: 91, Gram: Cattlefarm;
 Estd: 1967; Dir: Dr S P S Tomar, Ph: 90
 (resi); Livestock Offr: G R Sharma.
 Breed: Tharparkar, M 249, F 706.

GOVERNMENT OF RAJASTHAN, AH Dept — Cattle
 Breeding Farms — Chandan: Dist Jaisalmer;
 Breed: Tharparkar F 100. Dag 326514: Dist
 Jhalawar; Supdt: Dr B S Chobisa; Estd:
 1969; Breeds: Gir, Malvi, M 19, F 123.
Kumher 321201: Dist Bharatpur; Supdt: Dr
 T S Sethi; Estd: 1961; Breed: Marwari, M
 7, F 117. Nagaur: Estd: 1950; Supdt: Dr
 P S Poonia; Breed: Nagauri, F 61. Nohar
 335523: Dist Sri Ganganagar; Estd: 1971;
 Breed: Rath, M 25, F 58.

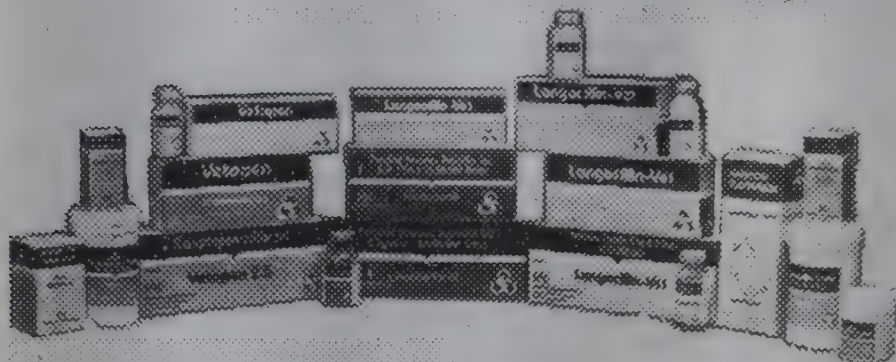
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 Stn; Dairy Sc Dept, Head: Dr V B Singh.
 Breeds: Holstein-Friesian, Jersey, Red
 Dane, Rath, crosses, M 2, F 27. AI faci-
 lities available.

SUKHADIA UNIVERSITY, All India Coordinated
 Research Project on Buffaloes, Livestock
 Research Station, Vallabhanagar 313601,
 Dist Udaipur; Anim Geneticist: Dr L S
 Jain; Vet Offr: Dr R K Tanwar; Asst Fodder
 Agronomist: B P Singh; Asst Gynaecologist:
 Dr Annu Deen; Jr Animal Geneticist: S P
 Tailor.

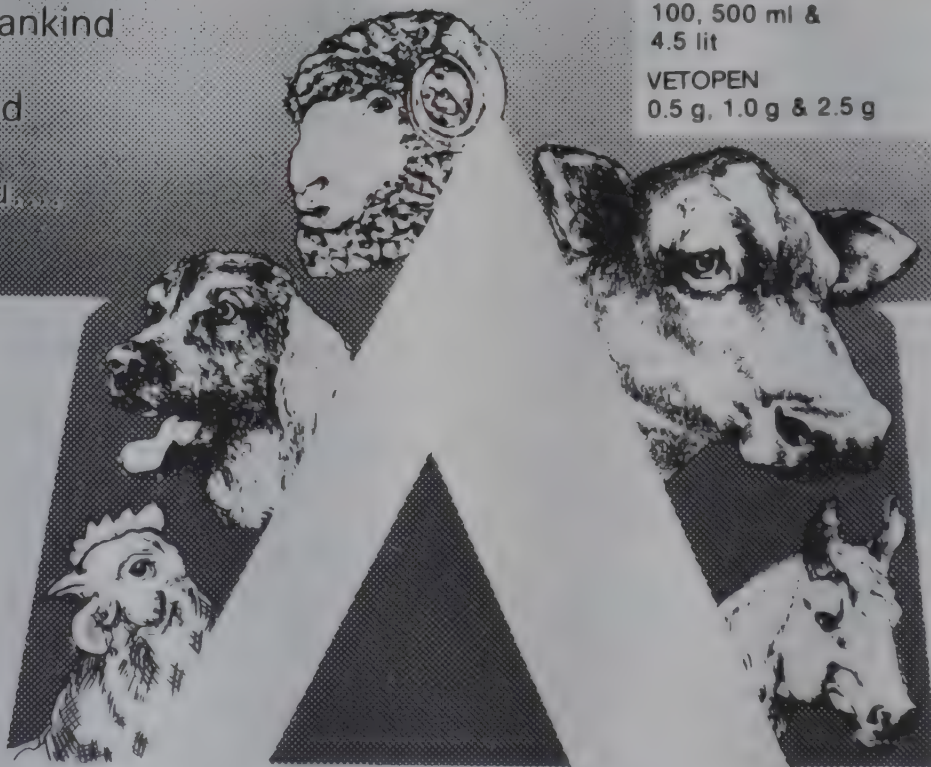
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0.5 g

PRIMICIN-VET
10 & 30 ml

PROCILLIN-VET
20 & 40 lac units

PIPERAZINE-LIQUID
(Veterinary)
100, 500 ml &
4.5 lit

VETOPEN
0.5 g, 1.0 g & 2.5 g

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Sulphate/Chloride
(Injection)

Ampicillin Sodium
(Injection)

Sulphadimidine
(Tablets)

Hamycin
(Suspension)
(Poultry Formula)

Benzathine
Penicillin G
(Injection)

Oxytetracycline
Hydrochloride
(Tablets)

Gentamicin
Sulphate
(Injection)

Fortified Procaine
Penicillin
(Injection)

Piperazine
Hexahydrate
(Liquid)

Strepto-Penicillin
(Injection)

UTTAR PRADESH

CENTRAL CATTLE BREEDING FARM (GOI), Andesh-nagar, PB No 63, Lakhimpur-Kheri 262701; Ph: 2535 (Lmp), Gram: Centralfarm; Estd: 1976; Dir Incharge: H S Rathore. Herd: Cattle, M 30, F 75.

DURGA PAYONIDHI, Suria Kuan, Basharatpur, Gorakhpur 273001; Ph: 4905, 4768, Gram: Dumet; 5 Km from Gorakhpur Rly Stn; Prop: Gautam Poddar. Breeds: Holstein-Friesian and crossbreds, F 170. AI facilities: Imported frozen semen used.

GOVERNMENT OF UTTAR PRADESH, AH Dept; Cattle Breeding Farms — Ata 285202: Estd: 1948; Farm Supdt: Dr G C Srivastava; Breeds: Haryana, Murrah. Babugarh 245201: Dist Meerut; Estd: 1949; Farm Mgr: Jai-pal Singh; Breeds: Bhadawari, Haryana. Bahugarh: Dist Ghaziabad; Estd: 1946; Breeds: Haryana, Murrah. Bharari: Jhansi; Estd: 1944; Farm Mgr: Dr R K Kanaujia; Breeds: Haryana, Murrah, Tharparkar; Chak Ganjaria: Lucknow; Estd: 1951; Farm Mgr: Dr B S Bhandari; Breeds: Murrah, Sahiwal. Jakhim: Arazilines, Dist Varanasi; Estd: 1949; Farm Supdt: K P Singh; Breed: Gangateri. Hastinapur 250404: Dist Meerut; Estd: 1947; Breeds: Haryana, Murrah. Kalsi 248158; Dehradun: Estd: 1948; Farm Mgr: Dr P K Sood; Breeds: Jersey, Sindhi. Lakhimpur 262701: Man-jhara, Dist Kheri; Estd: 1948; Farm Mgr: M S Tyagi; Breeds: Gangotri, Murrah. Niblett: Barabanki; Estd: 1948; Farm Supdt: K B L Srivastava; Breeds: Haryana, Murrah. Nilgaon: Sitapur 261301; Estd: 1948; 19 Km from Sidhauri Rly Stn; Farm Mgr: Dr Shivajeet Singh; Breeds: Haryana, Murrah, M 3, F 108. Saidpur: Lalitpur; Farm Mgr: J N S Paliwal; Breeds: Bhada-wari, Haryana.



HINDUSTAN LIVESTOCK SALES CORPORATION, 80 Hardwar Rd, PO IIP, Mohkampur, Dehradun 248005; Ph: 25853, Gram: Atma, Tlx: 0595-270/236; Pres: Dr A S Bindra. Branches: Bihar, Delhi, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, West Bengal; Overseas Branches: Denmark, Indonesia, Nepal, New Zealand, Philippines, USA. Foreign Principals for Purebred Cattle and Semen:

Bovidan, Denmark; Bovec, France; Union Des Cooperatives D'Elevage Aples Et Rhone; Animal Enterprises, New Zealand. ICAR PROJECT DIRECTORATE ON CATTLE IMPROVEMENT, c/o Military Dairy Farm, Meerut. INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Izatnagar 243122; Ph: 74069, Gram: Vetex, Tlx: 577-205; Dir: Dr P N Bhat; Incharge, Cattle Unit: Dr L P Nautiyal. Herd Strength: Cattle 250, Buffaloes: 100. LITERACY HOUSE, Bull Mother Farm (IDC Project), PO Alambagh, Lucknow 226005; Ph: 50467, 52517, Gram: Literacy; Dir: G S Chaudhri. Breed: Jersey, M 45, F 95. MATHURA VRINDABAN HASANAND GOCHAR BHUMI TRUST, 701 Gaughat, Mathura 281001; Ph: 3558; Estd: 1935; Pres: Motilal Shora-wala, Ph: 3525; Jt Sec: Ram Babu. Breed: Haryana. Herd Strength: 260. MILITARY FARMS — Agra (Herd Strength: 202), Allahabad (Herd Strength: 195), Bareilly (Herd Strength: 255), Dehra Dun (Herd Strength: 337), Jhansi (Herd Strength: 355), Kanpur (Herd Strength: 129), Lucknow (Herd Strength: 424), Meerut (Herd Strength: 622), Pithorgarh (Herd Strength: 60).

PRADESHIK COOPERATIVE DAIRY FEDERATION LTD Jersey Cattle Breeding Unit, Rae Bareli 229001; Ph: 2326, Gram: Dairyfed; 4 Km from Rae Bareli Railway Station; Farm Incharge: Dr N K Kapoor. Breed: Jersey M 9, F 43; Frozen semen available.

Western Region

GOA

GOVERNMENT OF GOA, DAMAN & DIU, Dte of AH & Vet Services: (i) Cattle Breeding Farm, Copardem, Sattari; Estd: 1983; Breed: Gir cows. (ii) Composite Livestock Farm, Dhat, Sanguem; Estd: 1963; Breeds: Jersey, Murrah, Red Sindhi, Surti and their crosses.

GUJARAT

AMUL RESEARCH AND DEVELOPMENT ASSOCIATION, Anand 388001; Ph: 3402, Gram: ARDA. Cattle Breeding Farm Project: Ode. Breeds: Surti Buffalo Bulls, 125; Cow Bulls: HF: 4, Jersey: 4, CB: 14. BIDDA PINJRAPOLE & GAUSHALA, Tk Mandvi, Dist Kutch. Breed: Kankrej.

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BOCHASANWASI SHREE AKSHAR PURUSHOTTAM GAUSHALA TRUST, PO Bochasan 388140, Tk Bor-sad, Dist Kheda; Estd: 1976; Ph: 26 (Bochasan); Administrative Incharge: Sadhu Dharmaviharidas Guru Narayanswarup-das. Breeds: Gir, Kankrej, Shankar. Herd Strength: 49.

CENTRAL CATTLE BREEDING FARM, Govt of India, Dhamrod 394125, Dist Surat; Estd: 1968; Dir: Dr S K Sinha. Breed: Surti. Herd Size: 605.

GOVERNMENT OF GUJARAT, Dte of AH — Cattle Breeding Farms — Bhuj: Dist Kutch; Estd: 1954; Ph: 293; Supdt: Dr G B Mehta; Breed: Kankrej M 80, F 188. Mandvi 394160: Dist Surat; Estd: 1964; Ph: 46; Supdt: Dr Pandya; Breeds: Kankrej, Jersey and their crosses, M 94, F 156. Morvi 363641: Dist Rajkot; Estd: 1951; Supdt: Dr I N Dave; Breed: Gir M 103, F 227. Thara 385555: Tal Shihori, Dist Banaskantha; Ph: 95; Estd: 1966; 19 Km from Oiyodar Rly Stn; Supdt: Dr R B Patel; Breed: Kankrej M 40, F 147. Intensive Cross-Breeding Programme (ICBP) — Mehsana: Ph: 20962; Asst Proj Offr: Dr J M Vyas; Rajkot: Ph: 43788; Asst Proj Offr: Dr P B Jhala; Vadodara: Ph: 556949; Asst Proj Offr: Dr K A Patel; Valsad: Ph: 3210; Asst Proj Offr: Dr J D Barot.

GUJARAT AGRICULTURAL UNIVERSITY — All India Coordinated Research Project on Buffalo Endocrinological Studies; Reproductive Biology Research Unit, PO Anand Agri Inst, Anand 388110; Scientist Incharge: Dr V M Mehta. Breed: Surti Buffaloes F 35 plus followers. Bull Mother Farm, IDC Project, Anand Campus, Anand 388001; Herd Size: M 5, F 100. Cattle Breeding Farm, Junagadh Campus, Junagadh 362001; Ph: 110 (93 Ext 47), Gram: CBF Agricampus; Res Scientist (Anim Scs): Dr O P Dhandra. Breeds: Gir M 5, F 167; Jaffrabadi M 1, F 34. Livestock Research Station, Anand Campus, Anand; Offr Incharge: Dr R K Shukla. Breeds: Holstein and Jersey crosses with Kankrej; Herd Strength: 150. Livestock Research Station, Dantiwada Campus, Sardar Krishinagar 385506; Ph: 39; Offr Incharge: Dr Radaria. Breed: Kankrej; Herd Strength: 150.

KAIRA DISTRICT MILK PRODUCERS' COOPERATIVE UNION LTD, Kanjari. Breed: Holstein-Friesian.

LOK BHARTI GAUSHALA, PO Sanosara 364230, Dist Bhavnagar; Ph: 22; Mgr: Prof R M Pandya; Dir: K D Thaker. Breeds: Gir, Holstein-Friesian, Jersey.

MANSA GAUSHALA TRUST, Mansa, Vijapur, Dist Mehsana. Breed: Kankrej.

SABARMATI ASHRAM GAUSHALA (Managed by NDDB), Bidaj Farm, PO Lali 387120, Tk Mehmada-bad, Dist Kheda; Ph: Bareja 80 & 14; Offr Incharge: Dr N B Patel; Mgr, Bull Mother Farm: Dr T K Ghosh; Mgr (ET): Dr M C Yadav. Branch Off: Harijan Ashram, Ashram Rd, Ahmedabad 380027; Ph: 407088. Breeds: Holstein-Friesian, Jersey, Gir, Kankrej and their crosses.

MAHARASHTRA

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE (BAIF), Central Cattle Breeding Farm, Central Research Station, Uruli-Kanchan 412202, Dist Pune; Ph: 248, 265, 348, Gram: Baifon, Tlx: 0145-283; Res Programme Organiser: Dr B R Mangurkar; Farm Mgr: Dr Y V Chaudhary. Breeds: Holstein-Friesian M 40, F 150; Jersey M 40, F 100; Murrah M 15, Surti M 7.

BOMBAY GOW RAKSHAK MANDALI, 54 F, Sitaram Podar Marg, Fanaswadi, Bombay 400002; Ph: 299271, 274160; Hon Gen Sec: Manoobhai Doongursee; Scientists: Dr C R Sane, Dr S Solomon, B C Dave. Branches: (i) Institute for Research and Dev of Dairy Cattle, Kandivli, Akurli Rd, Bombay 400101; (ii) Fodder Research and Grassland Dev Inst, Betegaon, Boisar (W Rly).

BOMBAY PANJRAPOLE, Near Madhav Baug PO, Panjrapole Compound, Bhuleshwar, Bombay 400004; Ph: 357193; Sec: K S Desai; Estd: 1834. Branches: Bhiwandi, Chembur, Lakhivli, Raita, Walsind. Breed: Pure Gir. Herd Strength: 1,350.

CATTLE BREEDING FARM, Govt of Maharashtra, Udgir 413512, Dist Latur; Ph: 180, Gram: Supdt, CBF Udgir; 4 Km from S T Stand; Supdt: Dr S S Dadke. Breed: Deoni. (Project preservation of Deoni Germ plasm).

GOVERNMENT OF MAHARASHTRA, Dte of AH, Cattle Breeding Farms — Bod: Dist Amravati; Estd: 1928; Asst Dir (AH): Dr Ingale; Breeds: Crossbred of Jersey, Kandhari, Nimari, Sahiwal, M 4, F 46; Harsool 431119: Dist Aurangabad; Exotic Cattle Breeding Farm; Estd: 1946; Ph: 3468; Breed: Jersey, M 1, F 50; Hetikundi: PO Kannamwargram, Dist Wardha; Estd: 1946; Asst Dir (AH): Dr S K Alkari; Breeds: Gaolao, Hariana, M 1, F 47; Hingoli 431513: Dist Parbhani; Ph: 778; Estd:

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1929; Asst Dir (AH): Dr Jawalikar; Breeds: Crossbred of Jersey, Khillar, Pethi, M 4, P 120; Jath: Dist Sangli; 10 Km from Jath Rd Ely Stn; Estd: 1960; Asst Dir (AH): Dr B B Patil; Breeds: Crossbred of Gir, Jersey, Khillar, M 3, P 90; Jawal: Khillar Cattle Breeding Farm, Tal Tangola 413307, Dist Solapur; 12 Km from Dhalgaon Ely Stn; Estd: 1958; Asst Dir (AH): Dr B N Dhole; Breed: Khillar, M 3, P 90; Kopergaon 423601: Dist Ahmednagar; Ph: 689; Estd: 1946; Asst Dir (AH): Dr R G Kulkarni; Breeds: Crossbred of Brown Swiss, Gir, Mariana, Jersey, P 44; Nagpur: Bull Rearing Centre, Nagpur Naka, Amchi Rd; Estd: 1969; Asst Dir (AH): Dr M N Netkar; Breed: Brown Swiss, Jersey, Mariana; Pohara: Dist Amravati; Estd: 1949; Asst Dir (AH): Dr K T Patil; Breeds: Crossbred of Brown Swiss, Goolao, Jersey, Tharparkar, M 3, P 80; Tatrasada: Dist Pune 411033; Exotic Cattle Breeding Farm; Estd: 1970; Asst Dir (AH): Dr V R Ashtekar; Breed: Jersey, M 1, P 120; Wajga: At Dewanganj, Dist Chandrapur; Estd: 1974; Dep Dir (AH): Dr P R Linge; Breed: Jersey, M 2, P 90; Yeotmal: Estd: 1948; Asst Dir (AH): Dr Kadhane; Breeds: Crossbred of Goolao, Jersey, Tharparkar, P 50.

BHOSALE DAIRY FARM & DAIRY SERVICE, Bhosalewadi, Belapur, Shrirampur, Ahmednagar 413715; Ph: 2362 (Shrirampur); Chief Exec: Pratap Bhosale. Breed: Holstein. Herd Strength: 40. AI and embryo transfer services provided.

KONKAN DEVELOPMENT CORPN, Aarey Milk Colony, Bombay 400065; Chief Vet Offr: R M Sawant. Breeds: Holstein-Friesian, Jersey.

MAHATVA PHULE KRISHI VIDYAPEETH, Rahuri 413722, Ahmednagar Dist. ICAR Project Directorate on Cattle Improvement. Breeds: Crossbreds of Holstein-Friesian and Jersey with Gir; Herd Strength: 100 plus followers.

MARATHWADA AGRICULTURAL UNIVERSITY, Cattle Crossbreeding Project, Balsa, Parbhani 431402; Ph: Univ 301-PEX 66; Sr Scientist: R B Sarode. Breeds: Deoni, M 1, P 110; Holstein-Friesian, M 1; Crossbred, M 2, P 280.

NASHIK PANCHAWATI PANIRAPOL, Panchawati, Nashik 422003; Ph: 74007; Estd: 1879; Mg Trustee: Ramji Pragji Jhaveri; Exec: Dr Buresh Gangavane. Breeds: Crossbred (500), Young crossbred (400), Gir (100), Buffaloes (100), Breeding bulls (25),

Non-descript (775). (Pure Gir cattle maintained and crossbred bull mother farm).

PANURAPOL SANSTHA SANGLI, Peth Bagh, Near Ganapati Temple, Sangli 416416; Ph: 4253; Estd: 1911; Pres: K A Awati, Ph (resi): 4253. Breeds: Gir, Jersey. Herd Strength: 158.

Southern Region

ANDHRA PRADESH

ANDHRA PRADESH AGRICULTURAL UNIV, Project Directorate on Cattle Improvement, Sam Farm (ARS) PO, Guntur 522034; Ph: 20485; Dr Scientist: Dr A C Sasamurti. 10 Km from Guntur Ely Stn. Breeds: Crosses of Brown Swiss, Holstein-Friesian, Jersey, Ongole, M 65, P 335.

ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD: Jersey Farm, Makarikallu 522615, Guntur Dist; Ph: 28; Proj Mgr: G Muthyalu.

GOVERNMENT OF ANDHRA PRADESH, AH Dept, Cattle Breeding Farms — Aswaraseti 501301: Dist Khammam; Asst Dir (AH): Dr Y Yadagiri Rao; Breed: Murrah (70). Banavasi 518360, via Yemmiganur, Kurnool Dist; Ph: 65 (Yemmiganur); 21 Km from Adoni Ely Stn; Estd: 1956 — (i) Govt Livestock Farm; Asst Dir (AH): Dr Ramakrishnaiah; Breeds: Murrah, Hallikar (80). (ii) Jersey Cattle Breeding Farm; Dep Dir (AH): Dr Mohd Yusuf; Breeds: Jersey, Ongole (271). (iii) Progeny Testing Unit; Asst Dir (AH): Dr M Suri Babu; Breed: Murrah (300). Gudgaripalli: Deoni Cattle Breeding Farm, Tal Saneerabad, Dist Medak; Asst Dir (AH): Dr Venkateswara Reddy; Breed: Deoni (40). Kakinada 533001: Sambamurti Nagar, Dist East Godavari; Ph: 3531; Estd: 1966; Asst Dir (AH): Dr Nagabhushana Rao; Breeds: Crossbred, Murrah, Ongole (65). Kannasagar 508217, PO Babasahebpet, via Vemulapalli, Tal Miryalguda, Dist Nalgonda; Ph: 30; Estd: 1966; 54 Km from Nalgonda Ely Stn; Asst Dir (AH): Dr Shanker Narayana; Breeds: Holstein-Friesian, Jersey, Deoni, Murrah, Ongole, Tharparkar and their crosses (110). Karimnagar: Estd: 1951; Asst Dir (AH): Dr Venkateswara Reddy; Ph: 2443; Breeds: Crosses of Murrah and Tharparkar (193). Mahanandi: Dist Kurnool; Estd: 1955; Asst Dir: G Narasimha Chetty; Breed: Ongole (180). Mamoor 506166: Dist Warangal;

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Estd: 1964; Ph: 2934; 8 Km from Warangal Rly Stn; Asst Dir (AH): Dr K Ramagopal Rao; Breeds: Murrah, Tharparkar and their crosses (237). Ramathirtham 531218: Ongole Cattle Breeding Farm, Dist Prakasam; Asst Dir (AH): Dr A Venkateswara Rao; Breed: Ongole (125). Reddipalli 531219, Dist Anantapur; Estd: 1961; Asst Dir (AH): Dr Venkat Reddy; Breeds: Crossbreds, Holstein-Friesian, Jersey, Murrah (104). Visakhapatnam: Govt Dairy Farm; Ph: 63317; 8 Km from Waltair Rly Stn; Dep Dir (AH): Akhil Ali Shah; Breeds: Crossbreds, Brown Swiss, Guernsey, Jersey, Ongole, Murrah (300).

IDL CHEMICALS LTD -- Bull Mother Farm: Dairy Agricultural Farm, PB No 1, PO Sanatnagar (IE), Hyderabad 500018; Ph: 261581, 260126, 261766, Gram: Orelidet, Secunderabad; Breed: Holstein-Friesian.

INDO-SWISS PROJECT, Visakhapatnam; Estd: 1948; Breeds: Brown Swiss, Ongole Crossbreds, F 50, Ongole, F 150.

MILITARY FARM, Secunderabad; Ph: 79251 Ext 250; Herd, Cattle: 507, Buffaloes: 243.

KARNATAKA

ASHIVERAM FARM, Kengeri, Bangalore Dist; Proj Mgr: Fr Paul.

CENTRAL CATTLE BREEDING FARM (GOI), Hessarghatta, Bangalore 560088 (30 Kms from Bangalore City Rly Stn); Ph: 384272; Estd: 1962; Dir Incharge: Dr P A Sarma; Farm Supdt: Dr A Ramu. Breed: Holstein-Friesian, 250.

GOVERNMENT OF KARNATAKA, Dept of AH & Vet Services -- Cattle Breeding Farms -- Ajjampur 577547: Cattle Breeding Station, Dist Chikmagalur; Estd: 1929; Ph: 22; Asst Dir (AH): Dr T S Krishna Murthy; Breed: Amrit Mahal. Bankapura 581202: Dist Dharwad; Estd: 1919; Asst Dir (AH): L M Daddur; Breeds: Khillar, Murrah. Bidar 585401: Deoni Cattle Breeding Farm; Supdt: Dr T N Muttalli; 27 Km from Bidar Rly Stn. Hessarghatta: Composite Livestock Farm & Research Station, Bangalore 560088; Estd: 1951; Ph: 384377; Asst Dir (AH): Dr D Narayana; Breeds: Amrit Mahal, Hallikar, Holstein-Friesian; Koila 574288: Dist Livestock Farm, Puttur Tal, Dist Dakshina Kannada; Ph: 73 (Uppinangady); Estd: 1950; 14 Km from Puttur Rly Stn; Asst Dir (AH): Dr P N Viegas; Breeds: Gir, Hallikar, Holstein-Friesian, Jersey, Murrah, Red Dane, Sindhi and their crosses; Strength: 350; AI facilities available. Kurikuppi: Combined Sheep & Cattle

Farm, PO Toronagalli, Dist Bellary; Estd: 1948; Asst Dir (AH): Dr Shivaji Rao Gaikwad; Ph: 46; Breed: Murrah; Tegur: Buffalo Breeding Station, Dist Dharwad; Estd: 1953; Asst Dir (AH): Dr M N Kathavate; Breed: Surti.

INDO-DANISH CATTLE BREEDING FARMS; Estd: 1964 -- Hessarghatta 560088: Ph: 388397; Supdt: Dr V S Joshi; Breed: Red Dane. Sub-Stations -- Dharwar: Supdt: Dr T S Krishnamurthy; Breed: Red Dane, Jersey. Kudige 571232: Kodagu Dist; Ph: 81 (Kung); 64 Km from Hassan Rly Stn; Supdt: Dr Sudhindra; Breeds: Jersey and crossbreds M 3, F 81; AI facilities available.

MILITARY FARM, Belgaum. Herd Strength: 209.

NATIONAL DAIRY RESEARCH INSTITUTE, Southern Regional Station, Adugodi, Bangalore 560030; Ph: 579661-4, Gram: Dairysearch, Tlx:845-8397 NDRI IN; Head: Dr S R Sampath, Ph off: 575119, resi: 565499. Breeds: Holstein-Friesian (50), Friesian Cross (200), Murrah & Surti Buffaloes (50).

UNIVERSITY OF AGRICULTURAL SCIENCES, Veterinary College, Hebbal, Bangalore 560024; Dept of Anim Genetics & Breeding, Assoc Prof: Dr M G Govindaiah, Ph: 365383 Ext 25 (off), 574878 (resi). UAS Cattle Farm, Dharwad Campus, Krishinagar, Dharwad 580005; Ph: 80191-80197; Geneticist: Dr P Basavaiah. Breed: Surti. All India Coordinated Res Programme on Buffaloes. Services: Frozen Semen & Progeny-tested bulls. All India Coordinated Research Project on Buffalo; Geneticist: Dr P Basavaiah.

KERALA

GOVERNMENT OF KERALA, Dte of AH -- Cattle Breeding Farms -- Kodapanakunnu: Dist Livestock Farm, Trivandrum Dist; Ph: 62962; Supdt: Dr G Sudevan; Breeds: Brown Swiss, Jersey, Murrah, Sindhi, Surti. Kuriottumala: Buffalo Breeding Farm. Maruthamala: Jersey Breeding-cum-Crossbred Farm, Adiparambu, via Nedumangad, Dist Trivandrum; Estd: 1975; 50 Km from Trivandrum Rly Stn; Breeds: Jersey, Holstein-Friesian, Rathi, M 10, F 170; AI by frozen semen. Thiruvazhun Kunnu: Breed: Surti. Vithura: Jersey Farm; Dep Dir: Dr Joseph Thevalakat.

INDO-SWISS PROJECT -- Kerala Livestock Development & Milk Marketing Board Ltd, 9/1148 Mani Bhavan, Sasthamangalam, Trivandrum 695010; Ph: 64954, Gram: Pasupal; Estd: 1963; Mg Dir: K J Alphons, IAS. Breeding Farms -- Dhoni: Dhoni Farm, -678016,

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Palghat Dist; Ph: 8127 (Palghat); Supdt: P Girijavallabhan, Ph (resi): 8128; Estd: 1978; Breeds: M 150 comprising Gir, Kankrej, Sunandini, Sahiwal and Murrah buffaloes; F 100 comprising Sunandini, Jersey Cross & Pure Jersey and Murrah buffaloes; Kulathupuzha 691310, Quilon Dist; Ph: 47, Gram: Milma Kpzh; Offr Incharge: Dr B Sasikumar, Ph (resi): 28; Estd: 1976; Breeds: M 90 comprising Sunandini, Jersey Crossbred, Jersey & Holstein-Friesian Crossbred; F 9 comprising Sunandini; Mattupatti 685616, Idukki Dist; Ph: 389, Gram: Indo-swiss; Offr Incharge: Dr Abraham Mathew; Estd: 1963; Breeds: M 170 comprising Sunandini, Jersey Cross, Holstein-Friesian Cross and buffaloes; F 130 comprising Sunandini; Peermadu: Fairfield PO, Idukki Dist; Ph: 52 (Elapara); Offr Incharge: Dr M P Gangadharan; Breeds: M 15 comprising Sunandini, Jersey Cross and Holstein-Friesian Cross; F 150 Sunandini, Jersey Crossbred, Kankrej, Sahiwal, Rathi or local. Cattle Breeding & Progeny Testing Co-ordination Centre, Muvattupuzha PO 686669; Ph: 2763, Gram: Pasupal; Offr Incharge: Dr C T Chacko, Dep Dir; Livestock Dev Offr: Dr P J Joseph; Cattle Breeding Expert: Fritz Schnieder.

KERALA AGRICULTURAL UNIVERSITY, Vellanikara 680654; Assoc Dir of Res: Dr M Subrahmanyam. Cattle Breeding Research Stations: Cattle Breeding Farm, Thummozhi, Pariyaram, via Chalakudi, Trichur Dist; Livestock Research Station, Thiruvazhankunnu PO, via Mannarghat, Palghat Dist; Univ Livestock Farm, Mannuthi, Trichur 680651.

LAKSHADWEEP

GOVERNMENT DAIRY UNIT, Animal Husbandry Complex, Kavaratti PO, via HPO Cochin 682001; Ph: 384; Estd: 1965; Offr Incharge: Dr M Varadarajan, Ph (resi): 388. Breeds: Sindhi and Crossbreds.

TAMIL NADU

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, Coimbatore; Breed: Murrah.

CENTRAL CATTLE BREEDING FARM (GOI), Avadi (Alamadhi), Madras 600052 (15 km from Avadi Rly Stn); Ph: 680508, Gram: Cent-murrah; Estd: 1973; Dir: Dr M P Nagpal; Vet Offr: Dr D Krishnan. Breed: Murrah buffaloes. Herd Size: 807.

GOVERNMENT OF TAMIL NADU, AH Dept; Cattle Breeding Farms — Chettinad 623102: Dist

Madurai; Estd: 1957; Ph: 75; Breeds: Murrah, Sindhi, Tharparkar. Chinnasalem: Breed: Alambadi. Eachenkottai: Dist Thanjavur; Estd: 1978; Ph: 20299; Breed: Jersey. Hosur 635110, Dist Dharmapuri; Estd: 1938; Ph: 2232; Breeds: Holstein-Friesian, Red Dane, Sindhi and their crosses. Madhavaram 600051: Madhavaram Dairy Farm, Madras; Ph: 647193; Ootacamund: Dist Nilgiris; Estd: 1927; Ph: 2710; Breeds: Brown Swiss, Holstein-Friesian, Jersey. Orathanad: Dist Thanjavur; Estd: 1954; Ph: 50; Breeds: Brown Swiss, Holstein-Friesian, Jersey, Murrah, Sindhi. Pudukkottai: Estd: 1951; Ph: 2518; Breeds: Jersey, Kangayam, Murrah, Sindhi. Tirunelveli: Ph: 3657; Breeds: Murrah, Sindhi.

MADRAS CHRISTIAN COLLEGE FARM, Thambaram, Madras 600059; Ph: 487290; Dir: Dr C B Viswanathan. Breed: Jersey.

TAMIL NADU COOPERATIVE MILK PRODUCERS' FEDERATION LTD, THE, Nucleus Jersey & Stud Farm, Finger Post, Udhamandalam 643006, Nilgiris Dist; Ph: 2695, Gram: Aavin. Breeds: Friesian M 5; Jersey M 64, F 74.

UNITED PLANTERS ASSOCIATION OF SOUTHERN INDIA: Bull Mother Farm, Glen View, Coonoor 643001; Ph: 2261, 2302, Gram: Upasi. Breed: Holstein-Friesian, F 5.

Central & Eastern Region

ARUNACHAL PRADESH

GOVERNMENT OF ARUNACHAL PRADESH, Dte of AH & Vet Services — Cattle Breeding Farms — Anini 792101: Dist Dibang Valley; Estd: 1962; Breeds: Crossbred; Changlang 791122; Estd: 1961; Breeds: Crossbred; Daporijo 791122: Dist Upper Subansiri; Estd: 1961; Breeds: Crossbred; Kameng: Dist Tawang; Estd: 1962; Herd: Local Breeds; Kamki: Along 791001, Dist West Siang; Estd: 1956; Breed: Crossbred; Nirjuli: Along 791001; Dist West Siang; Estd: 1956; Breed: Crossbred; Pasighat 791102: Dist East Siang; Estd: 1956; Breed: Jersey; Roing 792110: Dist Dibang Valley; Estd: 1961; Breed: Crossbred; Siang 791001 (Tuting): Dist West Siang; Estd: 1961; Breeds: Crossbred of Holstein-Friesian, Jersey, Siri; Soro: Dist Subansiri; Estd: 1956; Breeds: Holstein-Friesian, Jersey, Crossbred; Tezu 792001:

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Dist Lohit; Estd: 1961; Breed: Holstein-Friesian; Warjung: Dist Kameng; Breed: Holstein-Friesian; Yazali: Dist Subansiri; Breed: Holstein-Friesian.

ASSAM

ASSAM AGRICULTURAL UNIVERSITY CATTLE BREEDING FARM, Khanapara, Guwahati 781022; Ph: 87281. Breed: Crossbreds.

GOVERNMENT OF ASSAM, AH & Vet Dept; Livestock Farms — Barpeta Rd 781315: Barpeta, Dist Kamrup; Estd: 1946; Breeds: Haryana, Jersey, Murrah, Sindhi, M 17, F 386; Berhampur 782102: Dist Nowgong; Estd: 1959; Breeds: Jersey, Murrah, M 3, F 57; Guwahati: Khanapara, -781022; Estd: 1926; Breeds: Haryana, Jersey, Murrah, M 11, F 48; Jagduar: Kaliapani, PO Selenghat 785636, Dist Sibsagar; Estd: 1959; Breeds: Haryana, Jersey, Murrah, Sahiwal, Sindhi, F 38; Khanikar: PO Sessa, Dist Dibrugarh; Estd: 1955; Breeds: Guernsey, Haryana, Murrah, F 25; Manja: Lumbajang; Estd: 1968; Mgr: B Mahanta; Breeds: Haryana, Jersey, M 4, F 91; Pachmile 784025: Napam, Dist Darrang; Estd: 1964; Breeds: Haryana, Jersey, Murrah, Sahiwal, M 10, F 80. Silchar Medical College PO: Ghungoor, Silchar 788014, Dist Cachar; Estd: 1958; Breeds: Jersey, Murrah, Sahiwal, Sindhi, F 10.

INDO-AUSTRALIAN CATTLE BREEDING PROJECT, Barpeta, PO Barpeta Rd 781315; Ph: 58; 6 Km from Barpeta Rd Rly Stn; Estd: 1946; Breeds: Jersey, Sindhi, M 25, F 275.

BIHAR

BIRSA AGRICULTURAL UNIVERSITY, Ranchi Vet College, Dept of Anim Breeding & Genetics, Ranchi 834007; Prof-in-charge: Dr C S P Singh; Breeds: Friesian crosses from Tharparkar, Haryana & non-descript cows. Herd Strength: 250.

EXOTIC CATTLE BREEDING FARM, Govt of Bihar, PO Vet College, Patna 800014; Estd: 1977; Ph: 24320; Proj Offr: Dr M P Singh; Breed: Jersey Bulls.

GOVERNMENT OF BIHAR, AH Dept — Cattle Breeding Farms — Dumraon 802119: Haryana Cattle Breeding Farm; Estd: 1949; Mgr: Dr Ramanand Roy; Breed: Haryana; Gauriakarma: Govt Cattle Breeding Farm, Hazaribagh Dist; Estd: 1955; Supdt: Dr C A Bilung; Breeds: Jersey, Sindhi; Patna: Exotic Cattle Breeding Farm; Proj Offr: Dr M P Singh; Breed: Holstein-Friesian; Purnea: Estd: 1956; Breed: Tharparkar; Ranchi: Hotwar Farm; Gen Mgr: Dr P

Chakravarty; Sariakala 833219: Estd: 1956; Breeds: Haryana, Murrah; Sepaya: Estd: 1975; Breed: Murrah.

KRISHI GRAM VIKAS KENDRA: Exotic Bull Mother Farm, Vill Rukka-Hutup, PO Neori-Vikas 835217, Ranchi; Estd: 1978; Ph: 7268; Chief Administrator: S K Kakar; Breeds: Holstein-Friesian, Jersey, F 82; 13 AI centres; Frozen Semen; 80 villages attached for extension work.

MILITARY DAIRY FARM, Namkum, Ranchi 834010; Herd Size: 201.

MILK SUPPLY-CUM-DAIRY FARM, Hotwar, Ranchi; Estd: 1962. Breeds: Haryana, Murrah.

RANJENDRA AGRICULTURE UNIVERSITY, Pusa 848125, Samastipur Dist.

SHRI GOSHALA, Bhagalpur 812002; Estd: 1885; Ph: 232; Hon Gen Sec: Shankar Lal Bajonia; Mgr: Nand Kishore Jha. Breeds: Jersey (34), Haryana (16).

MADHYA PRADESH

GOVERNMENT OF MADHYA PRADESH, Dte of Vet Services, Cattle Breeding Farms — Agar 465441: Malva, Dist Shajapur; Estd: 1938; Breeds: Jersey, Malvi, M 100, F 215. Anjora: Durg; Ph: 630; Estd: 1956; Breeds: Murrah, Sahiwal, M 200, F 450. Bhadbhada: Bhopal; Estd: 1976; Ph: 63020; Breed: Jersey, M 60, F 180. Chandkhuri: Raipur; Breeds: Crossbreds of Jersey, Haryana, M 60, F 120. Garhi: PO Baihar 481111, Dist Balaghat; Estd: 1917; Breeds: Haryana, Jersey and crossbreds, M 50, F 140. Imlikheda: Chindwara; Estd: 1955; Breeds: Haryana, Jersey and their crosses, M 40, F 140. Kiratpur: PO Itarsi 461111; Estd: 1956; Breeds: Haryana, Murrah, M 70, F 180. Minora, PO Kundeshwar, Dist Tikamgarh; Estd: 1972; Breeds: Jersey, Haryana, Sahiwal and their crosses, M 40, F 150. Pakaria: PO Bendra Rd, Dist Bilaspur; Estd: 1929; Breeds: Haryana, Jersey, Sahiwal and their crosses, M 65, F 140. Ratona: PB No 2, Sagar; Estd: 1946; Breeds: Murrah, Thari, Thari x Jersey, M 70, F 200. Rodia: Dist Khargone; Estd: 1979; Breed: Nimari, M 60, F 90. Sarkanda: Dist Bilaspur; Estd: 1948; Breed: Jersey, M 30, F 140.

JAWAHARLAL NEHRU KRISHI VISHWA VIDYALAYA, College of Vet Sc & AH, South Civil Lines, Jabalpur 482001; Project Directorate on Cattle Improvement; Ph: 23771 Ext 47, Gram: Krivishwa; Proj Coordinator: Dr H K B Parekh. Breeds: Gir, Cross with Holstein-Friesian, Jersey, F 100. M P DUGDHA MAHASANGH (SAHAKARI) MARYADIT,

Guru Teg Bahadur Complex, Roshanpura,
Bhopal 462003. Farm: Bhadbhada. Breed:
Jersey.

MILITARY FARM, Mhow. Herd Strength: 150.

MANIPUR

GOVERNMENT OF MANIPUR, Dte of Vet & AH;
Cattle Breeding Farm -- Turibari, Imphal.

MEGHALAYA

GOVERNMENT OF MEGHALAYA, Dte of AH & Vet;
Cattle Breeding Farms -- Kyrdemkulai:
Regional Jersey Cattle Breeding Farm;
Asst Res Offr: Dr G C Phukon. Tura:
Rongkhon; Mgr: Dr R D Roy.

INDO-DANISH PROJECT, Upper Shillong 793009;
Estd: 1972; Ph: 3424; 115 Km from Guwa-
hati Rly Stn; Agronomist, Incharge: Dr M
A Hasmat; Breeds: Crossbred, M 10, F 60.

MIZORAM

GOVERNMENT OF MIZORAM, Dte of AH & Vet;
Cattle Breeding Farms -- Lungpher:
Lunglei 796106; Saiba 796107; Selesih:
Ph: 234; Herd: F 35.

NAGALAND

GOVERNMENT OF NAGALAND, Dte of Vet & AH;
Regional Brown Swiss Cattle Breeding
Farm, Jahukie; Mgr: Dr S U Ahmed. State
Cattle Breeding Farms -- Aliba: PO Mokuk-
chung; Sr Farm Mgr: Dr Panger Toshi;
Lerie: PO Kohima; Sr Farm Mgr: Dr L
Moses; Medziphema: Sr Farm Mgr: Dr V
Salieyie; Tuensang: Farm Mgr: Dr Y Tep.

ORISSA

CENTRAL CATTLE BREEDING FARMS (GOI) --
Chiplima 768111, PO Basantpur, Dist
Sambalpur; Ph: Burla-23; Estd: 1968;
30 Km from Sambalpur Rly Stn; Breed:
Red Sindhi; Herd: 576; Dir: Dr A D
Chhabra; Vet Offr: Dr M N Haque; Live-
stock Offr: L S Rana. Sunabeda 763002:
Semiliguda, Dist Koraput; Ph: 390, Gram:
Centjersey; 18 Km from Koraput Rly Stn;
Estd: 1973; Dir: Dr B K Singh; Livestock
Offr: Dr M K Mazumdar; Breed: Jersey;
Herd Size: 600.

GOVERNMENT OF ORISSA, Dte of AH & Vet Ser-
vices; Cattle Breeding Farms -- Bhanja-
nagar 761126, Dist Ganjam; Offr Incharge:
Dr B C S Rao; Bhawanipatna 766001: Dist
Kalahandi; Offr Incharge: Dr L N Mohanty;
Bolangir: Offr Incharge: Dr N K Das;
Breed: Red Sindhi; Boudh: Dist Phulbani;
Offr Incharge: Dr G C Panda; Breed:

Haryana; Chiplima 768026: Exotic Cattle
Breeding Farm, PO Kalamati, Dist Sambal-
pur; Offr Incharge: Dr J N Chowdhury;
Breeds: Haryana, Red Sindhi; Kathapal:
Dist Mayurbhanj; Offr Incharge: Dr A
Mohanty; Keonjhar 758001: Offr Incharge:
Dr T Das; Breed: Haryana; Khapuria:
Dist Cuttack; Offr Incharge: Dr R K
Mohanty; Kuarmunda 770039: Dist Sambal-
pur; Offr Incharge: Dr P Nayak; Sunder-
garh: Offr Incharge: Dr I C Patnaik.

SIKKIM

GOVERNMENT OF SIKKIM, Dept of AH, Cattle
Breeding Farm -- Tadong: Livestock Farm,
Gangtok 737102; Ph: 505; Farm Supdt: C K
Gurung. Breed: Jersey.

TRIPURA

GOVERNMENT OF TRIPURA, AH Dept; Cattle
Breeding Farm -- Radhakishorepur 799120:
Ph: 1390; Incharge, Dep Dir (AH): Dr G B
Chowdhury; Breeds: Exotic F 150.

WEST BENGAL

DON BOSCO MISSION, Krishnanagar; Breeds:
Holstein-Friesian, Jersey.

GOVERNMENT OF WEST BENGAL, Dept of AH; Cattle
Breeding Farms -- Haringhata: Research-
cum-Breeding Station, Haringhata, PO
Mohanpur 712701, Dist Nadia; Ph: Kalyani
432, 623; Estd: 1949; Breeds: Holstein-
Friesian, Jersey, Murrah, Crossbreds.
Kalyani 741235: State Livestock Farm,
Dist Nadia; Ph: 366; Jt Dir of AH: Dr J
Nag; Dep Dir: Dr J Mitra. Kurseong
734203: Dist Darjeeling; Estd: 1975;
Breeds: Holstein-Friesian, Jersey. Pedong
734311: Dairy Demonstration Farm; Dist
Darjeeling; Estd: 1975; Breeds: Holstein-
Friesian, Jersey. Ranjitpur: Dairy Demon-
stration Farm; Dist Bankura. Salboni
721147: Exotic Cattle Breeding Farm, PO
& Dist Midnapore; Ph: Mid 526; Estd: 1975;
Jt Dir of AH: P B Panda; Breeds: Holstein-
Friesian, Jersey. Suri: Dairy Demonstra-
tion Farm, Salboni, Dist Midnapore; Estd:
1976. Santaldih 723145: Dist Purulia;
Estd: 1973; Breeds: Holstein-Friesian,
Jersey.

INDIAN INSTITUTE OF TECHNOLOGY: Bull Mother
Farm, Kharagpur 721302; Breed: Jersey,
M 1, F 61.

MILITARY FARMS -- Bengdubi: Herd Strength:
70; Binnaguri: Herd Strength: 53; Pana-
garh 713420: Herd Strength: 91.

Late Additions

ASSAM

MILITARY FARM, Missamari. Herd Strength: 96.

GUJARAT

BAIF-MAGAZARI FARM, At & PO Zamp 382110, Tal Sarand, Dist Ahmedabad; Ph: 386940 (Ahmedabad); Mgr: M G Chavada (Field Res Offr); Campus Dev Offr: M S Rathod. Breeds: Gir, Kankrej, Holstein Friesian, Jersey. Herd Strength: 142.

BAIF RURAL INSTITUTE FOR SOCIO-ECONOMIC RE-CONSTRUCTION, Dantianagar Society, Kadod 394335, Tal Bardoli, Dist Surat; Ph: 94; Campus Dev Offr: P B Patel. Breeds: Holstein Friesian, Jersey. Herd Strength: 75.

HARYANA

MILITARY FARMS -- Ambala: Herd, Cows: 1,038; Birhantauri (Young Stock Farm): Herd, Cows: 601.

SHRI GAUSHALA, Jind; Pres: Pt Shyam Lal; Vice Pres: Lala Chabil Das; Sec: Lala Ram Pratap; Jt Sec: Mangat Ram; Mgr: Om Prakash Sharma. Herd Strength: 618.

KARNATAKA

MILITARY FARMS -- Agaram (Young Stock Farm): Herd, Cows: 394; Bangalore: Herd, Cows: 659; Belgaum: Herd, Cows: 209.

MADHYA PRADESH

KASTURBAGRAM KRISHI KSHETRA (GOSHALA), Kasturba Gandhi Memorial Trust, Kasturba-gram, Indore 452020; Ph: 63148, Gram: Kasturgram; Dir: T G K Menon, Ph (resi): 63148; Mgr: R S Patel, Ph (resi): 60265. Breed: Gir. Herd Strength: 150.

MILITARY FARM, Jabalpur. Herd, Cows: 457.

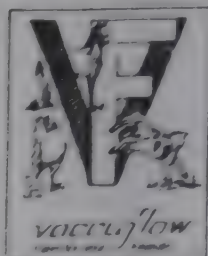
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MILITARY FARMS -- Ahmednagar: Herd, Cows: 210; Deolali: Herd, Cows: 229, Buffaloes: 6; Pimpri: Herd, Cows: 1,025; Manjari (Young Stock Farm, Strength: 503 Cows).

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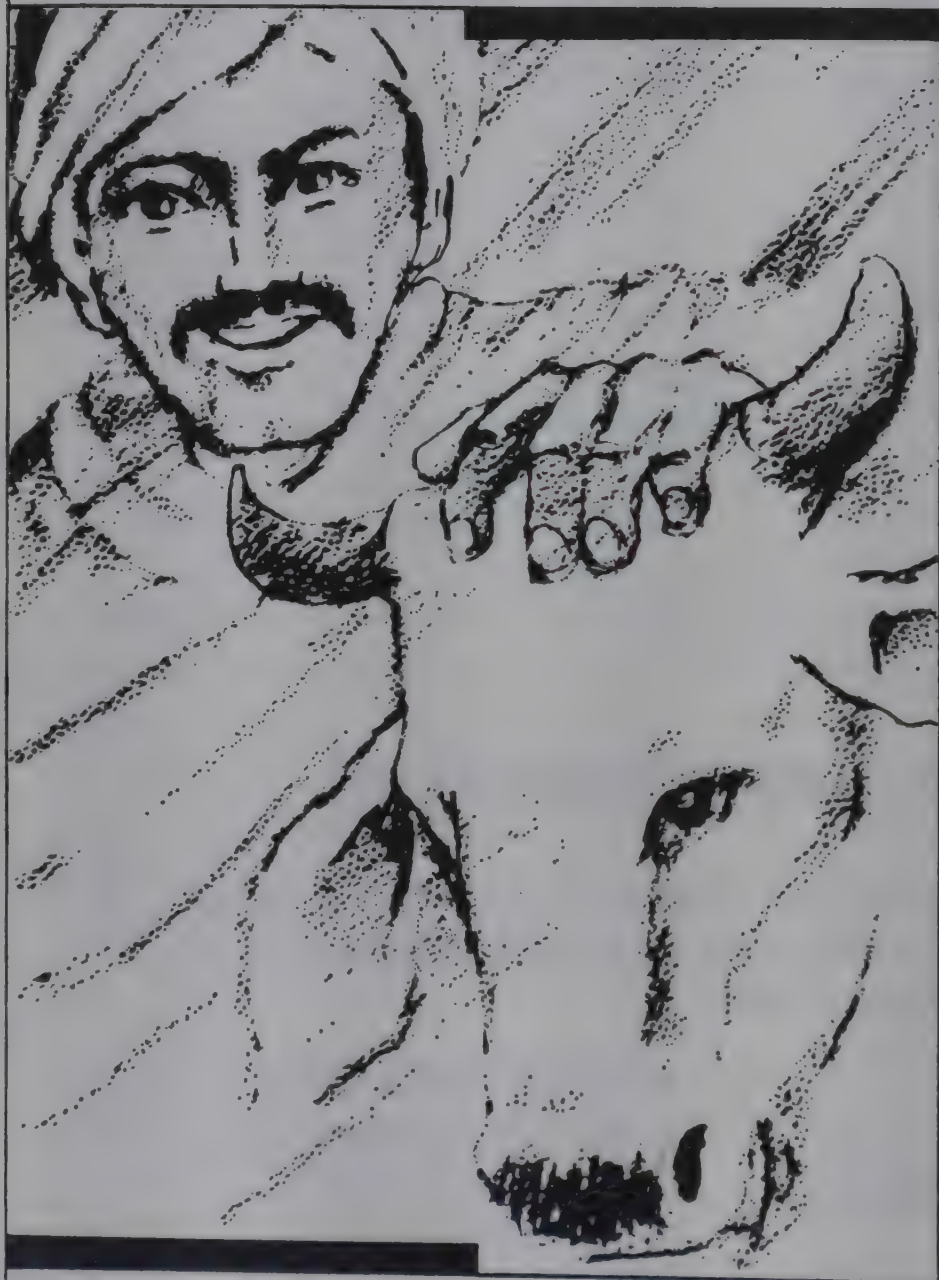


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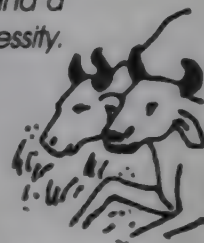
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New Delhi 110002; Ph: 730311; Asst Gen
Mgr: G S Narang; Southern Region: Hamid
Bldg, 2nd Floor, 190 Anna Salai, Madras
600006; Ph: 83924; Asst Gen Mgr: S S
Tulsi; Eastern Region: 2 Fairlie Place,
3rd Floor, Calcutta 700001; Ph: 229023,
Tlx: 21-2146; Regl Mgr: D N Mukherjee;
North Eastern Region: G S Rd, Bhangagarh,
Guwahati 781005; Ph: 87474; Regl Mgr: S
K Som; Ahmedabad Region: Hasubhai Cham-
bers, Near Town Hall, Ellisbridge,
-380006; Ph: 77108; Regl Mgr: B N Madan;
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Court, 3rd Floor, Basheerbagh, PB No 39,
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Mango Lane, PB No 113, -700071; Ph:
230445, 237729, 237781; Chandigarh:
36/37 Sector 17-A, Near Jagat Cinema,
PB No 49, -160017; Ph: 31612, 25955,
25954; Ernakulam: Kondomkulathi Towers,
M G Rd, Cochin 682011; Ph: 354377;
Hyderabad: Parishram Bhavan, 5-9-58/B
Fateh Maidan Rd, -500029; Ph: 234281,
236343; Kanpur: Green House, 15/60 Civil
Lines, -208001; Ph: 211125/26/27/28;
Madras: Spencer Towers, 3rd Floor, 770-A
Anna Salai, PB No 270, -600002; Ph:
87809, 89174/15/16; New Delhi: Gulab
Bhawan, 6 Bhadurshah Zafar Marg, PB No
7019, -110002; Ph: 3319657, 3317570,
3318531; Pune: Gulmohar Apartments, 2420
Gen Thimmayya Rd, -411001; Ph: 67452,
61261/62.



ORIENTAL INSURANCE COMPANY LIMITED, Rural Insurance Dept: Hansalaya Bldg, 10th Floor, Barakhamba Rd, New Delhi 110001; Ph: 3315091; Asst Gen Mgr: N P Desai, Ph: 3310540; Mgr: P Charan, Ph: 3314878; Asst Mgr: L K Joshi. Regd Off: Oriental House, A-25/27 Asaf Ali Rd, PB No 7037, New Delhi 110002; Ph: 279221, Gram: Orientins, Tlx: 62583, 62643, 66454; Gen Mgrs: R K Trehan, Ph: 267852; N Balaraman, Ph: 274876; U Mahesh Rao, Ph: 264219; M M Bhagat, Ph: 267446. Regional Offices -- Ahmedabad: Kalidas Chambers, 3rd Floor, Near Dinbai Tower, Lal Darwaja, PB No 267, -380001; Ph: 393486; Regl Mgr: J Bamzai; Bangalore: Leo Shopping Complex, 1st Floor, 44-45 Residency Rd, PB No 25123, -560025; Ph: 569138; Regl Mgr: T S Balasubramaniam; Bombay: Oriental House, 2nd Floor, Main Wing, 7 Jamshedji Tata Rd, -400020; Ph: 220494, 221934; Asst Gen Mgr: A V Kapadia; Calcutta: 4 Lyons Range, -700001; Ph: 203421, 207995; Asst Gen Mgr: R G Vaidya; Chandigarh: Surendra Bldg, SCO 109-111, Sector 17-D, -160017; Ph: 45257; Regl Mgr: R K Sharma; Guwahati: G S Rd, Ulubari, -781007; Ph: 32040, 32662; Regl Mgr: L N Mishra; Hyderabad: 301-302 Al Karim Trade Centre, M G Rd, Raniganj, Secunderabad 500003; Ph: 231835, 231032; Regl Mgr: A Radhakrishna; Indore: Awarani Bldg, 569/3 M G Rd, Opp Tukoganj P S, PB No 171, -452001; Ph: 33214; Regl Mgr: R L Bhan; Lucknow: 43 Hazratganj, PB No 97, -226001; Ph: 34886; Regl Mgr: Ashok Kumar; Madras: UIL Bldg, 4th Floor, Esplanade, PB No 1877, -600108; Ph: 562675, 562678; Asst Gen Mgr: P S Seshadri; New Delhi: 86-88 Janpath, Connaught Circus, -110001; Ph: 321734, 350233; Asst Gen Mgr: K N Rao; Pune: Jeevan Darshan, N C Kelkar Rd, -411030; Ph: 446054; Regl Mgr: V Rajguru.



UNITED INDIA INSURANCE COMPANY LIMITED, 24 Whites Rd, PB No 676, Madras 600014;

Ph: 810061, Gram: Unigroup, Tlx: 41-484 Gen Mgr: M V S Apparao, Ph: 88299; Asst Gen Mgr: N Ramalingam, Ph: 88313; Mgr: S Guha, Ph: 812008; Mgr: T M Dutta, Ph: 87567; Dep Mgr: P R Tirumalai, Ph: 87567. Regional Offices -- Ahmedabad: 'Pushpak' 6th Floor, Khanpur, -380001; Ph: 23593, 24294; Dep Mgr: G N Divetia, Ph: 24229; Bangalore: Sankaranarayana Bldg, 1st Floor, 25 M G Rd, -560001; Ph: 573583; Dep Mgr: Ch Sarabhayya, Ph: 564392; Bombay: (i) Stadium House, Vth Floor, Veer Nariman Rd, PB No 977, -400001; Ph: 220562; Asst Gen Mgr: V Natarajan, Ph: 220684; (ii) Maker Bhavan No 1, 3rd Floor Sir V T Marg, PB No 11258, -400020; Ph: 291654, 293867; Regl Mgr: P L Barua, Ph: 296110; Calcutta: Himalaya House, 2nd Floor, 31-B Chowringhee Rd, PB No 9118, -700071; Ph: 298774, 298766; Dep Mgr: K S Nair, Ph: 298780; Chandigarh: SCO No 177-178, Sector 8-C, PB No 225, -160008; Ph: 31977, 31714; Regl Mgr: S K Kanwar, Ph: 32710; Cochin: XXXVIII/1782 E, Jos Trust Bldg, Chittoor Rd, PB No 3644, -682035; Ph: 366893, 366853; Regl Mgr: T G Menon, Ph: 361305; Coimbatore: IVth Floor, Bob Bldg, State Bank Rd, -641018; Ph: 35513; Regl Mgr: R Rangarajan; Guwahati: G N Bordoloi Rd, Silpukauri, -781003; Ph: 25143, 28226; Regl Mgr: D K Kar; Hyderabad: 3-5-817 Basheerbagh, -500029; Ph: 231894, 231845; Asst Mgr: Dr G Gandhi; Jaipur: Shri Digamber Jain Dharmshala Bldg, 1st Floor, M I Rd, PB No 233; Ph: 74311, 74312; Regl Mgr: G S Puri, Ph: 79653; Lucknow: Pravin House, 28-A Vidhan Sabha Marg, -226001; Ph: 71965, 71933; Regl Mgr: R S Srivastava, Ph: 71963; Madras: (i) Tarapore Towers, 826 Anna Salai, PB No 2770, -600002; Ph: 812035, 81809; Asst Gen Mgr: S P Mani, Ph: 81946; (ii) 5 Greaves Rd, -600006; Ph: 473933, 473007; Dep Mgr: R Krishnamurthy, Ph: 474992; New Delhi: 501-504 Kailash Bldg, 26 Kasturba Gandhi Marg, -110001; Ph: 3314011, 3313360; Mgr: J P Srivastava, Ph: 3313055; Pune: Bharathi Vidyapeth Bhavan, Lal Bahadur Sastri Marg, -411030; Ph: 30334, 30913; Regl Mgr: T R Balan, Ph: 444016; Visakhapatnam: 50-81-1 Rajendra Nagar, -530016; Ph: 65821; Regl Mgr: S N R Mohapatro.

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Chemicals

Listed below are manufacturers/suppliers/dealers of wide range of chemicals, including emulsifiers, stabilisers, flavours and colours, preservatives and laboratory chemicals. It is followed by a Buyer's Guide.

A CHOCKSEY CHEMICAL INDUSTRIES, 101 Mahatma Gandhi Rd, Fort, Bombay 400001; Ph: 273868, 274006. Product: Tri Sodium Phosphate, Sodium Hexameta Phosphate.

A PANALAL UMABHAI, Haveli Bldg, Fatasa St, Ahmedabad 380001. Product: Citric Acid.

AGROMORE LIMITED, Mysore Rd, Bangalore 560026; Ph: 603624, Gram: Agromor, Tlx: 0845-334; Mg Dir: M A Parthasarathy; Mgr, Agrochemicals Div: Dr B S Shetty. Branches: New Delhi, Madras. Brand Names: Ratonil Concentrate & Ratokilbar.

ALVIN CHEMICALS (I) PVT LTD, W-9 MIDC, Ahmednagar 414111. Product: Caramel.

AMBA CHEMICALS, 35 Western India House, Sir P M Rd, Fort, Bombay 400001; Ph: 250566. Product: Ferrous Sulphate, Sodium Citrate.

ASHIS INDUSTRIAL CORPORATION, 15 India Exchange Place, Calcutta 700001; Ph: 229207, 221720. Products: Caustic Soda Lye, Chlorine Solution, Hydrochloric Acid, Sodium Hexameta Phosphate.

ASHISH CHEMICALS, 35 Pursotham Nagar, Behind Urmi Colony, Alkapuri, Baroda 390007. Product: Tri Sodium Phosphate.

ASIAN CATALYST & CHEMICALS, 12 Vithal Nagar Society, North-South Rd No 10, Bombay 400049; Ph: 573168; Prop: G S Chatterjee. Product: Iodophors Compound. Brand Name: Asiphor, Asielen.

ASSOCIATED AROMATICS, 7 Tatya Tope Marg, Madho Nagar, Ujjain 456001; Ph: 4534, 3312; Prop: Surendra Jain; Dr Rajendra Jain. Products: Amyl Alcohol, Idophore, detergent.

ATUL CHEMICAL & PHARMACEUTICAL INDUSTRIES, 25A/4 Deputy Ganj, Moradabad 244001; Ph: 6523, 6880. Product: Amyl Alcohol.

B PATEL & CO, Station Rd, Anand 388001. Products: Soda Ash, Pure Salt.

BEST CHEMICAL CORPORATION, Ranunga Mansion, 3rd Floor, Kapasia Bazar, Ahmedabad. Product: Bleaching powder

BEST PHARMACEUTICALS & CHEMICALS, 6 Swastik Super Market, Ashram Rd, Navrangpura, Ahmedabad 380009; Ph off: 449807, fact: 827314. Product: Amyl Alcohol.

BHANWARLAL JHANWAR & SONS, 9 Keshavji Naik Rd, 2nd Floor, R No 14, Bombay 400009; Ph: 867283, 8726199, 8725880. Product: Amyl Alcohol.

BHAVNA CHEMICALS, 24 L G Nagar, Nizabpura, NH 8, Baroda 390002. Product: Idophor Polysan, Algicide L.

BOMBAY CHEMICALS, 606 Yashkamal, Station Rd, Baroda. Product: Nitric Acid.

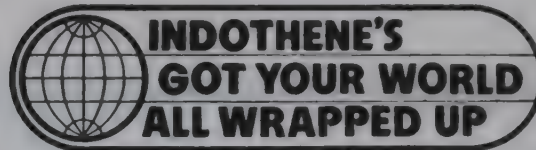
BRAJESHLAB, C-197 Mayapuri Industrial Area, Phase II, PB No 9911, New Delhi 110064; Ph: 5417266, 5413965, 535349 (24 hrs), Gram: Brajeshlab; Chief Execs: B N Mittal, J M Mittal. Brand Names/Products: Pentanol (Iso-Amyl Alcohol), Brajinol (Milk Testing Alcohol), Iso-Amyl Acetate, Afogel and Agonil (Turkey Red Oils), Detergents, fine chemicals, reagents.



BUSH BOAKE ALLEN (INDIA) LIMITED, 1-5 Seven Wells St, St Thomas Mount, Madras 600016; Ph: 431131 (5 lines), Gram: Boake, Tlx: 041-7758 BBA IN; Mg Dir: P C Mathew; Vice Pres (Mktg): A D Vittal Rao. Branches: Bombay, Calcutta, Madras, New Delhi. Products: Essences, flavours and colours. Brand Name: Bush.

CANARA INDUSTRIES, 75 Laxmi Bldg, 4th Floor,

See also LATE ADDITIONS at the end of the listing



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- Sir P M Rd, Fort, Bombay 400023. Product: Algicide L.
- CHEM DYES CORPORATION, Santosh Apt, Kothi, Baroda. Product: Formlin.
- CHEMI COMPLEX, Raheja Chambers, 213 Nariman Point, Bombay 400021; Ph: 242885, 242802; Chief Exec: Rasiklal M Doshi. Product: Butylated Hydroxy Aisole.
- CHEMICAL CENTRE, N H 8, Octroi Naka, Chani Rd, Baroda. Product: Formlin.
- CHEMICAL CORPORATION OF INDIA, Godavari Bldg, Mukund Patil Rd, Andheri, Bombay 400058; Ph: 576361, 573855; Partner: M B Jagmagia. Product: Nitric Acid.
- CHEMICAL TRADERS, 188/1 Gali Saraswati, Tilak Bazar, Delhi 110006; Ph: 2528207; Prop: A P Gupta. Product: Amyl Alcohol.
- CHEMICALS & ASSOCIATES, 10184 Arya Samaj Rd, Karol Bagh, New Delhi 110005; Ph: 5718788. Product: Amyl Alcohol.
- CHEMSELL, 146 D N Rd, 28 Empire Bldg, Bombay 400001; Ph: 2040277. Product: Bleaching powder.
- CHOKSHI DYE CHEM, 25 Paraskunj Society, Satellite Rd, Ahmedabad 380015. Product: Caustic Soda, Soda Ash.
- CITRIC INDIA LTD, Empire House, 3rd Floor, 214 Dr D N Rd, Fort, Bombay 400001; Ph: 2042979. Product: Citric Acid.
- CITURGIA BIOCHEMICALS LTD, Neville House, J N Heredia Marg, Ballard Estate, Bombay 400038; Ph: 266941, 266742. Product: Citric Acid.
- CONCORDE CHEMICAL CORPORATION, Anand Bldg, 4th Floor, Kazi Syed St, Bombay 400003. Product: Butylated Hydroxy Amisole.
- CONSOLIDATED SOLVENTS & CHEMICAL CORP, 52/58 Babu Genu Rd, Bombay 400002; Ph: 317395, 312251, Gram: Consolchem, Tlx: 11-2626 ZVRI IN; Partners: H N Zaveri, M H Zaveri, H H Zaveri. Product: Butylated Hydroxy Amisole.
- CORN PRODUCTS CO (INDIA) LTD, Shree Niwas House, H Somani Marg, PB No 994, Bombay 400001; Ph: 2042321, 2040211. Product: Caramel.
- DAIRY INSTRUMENTS & CHEMICALS, Jain Mandir St, Ambala Cantt 133001.
- DAVARS M P ORGANICS, Tansen Rd, Gwalior 474002; Ph: 23741, 21061, Gram: Koldstore; Mg Dir: Dr (Mrs) M Davar; Tech Dir: Dr G S Davar, Ph (resi): 23741, 26443. Product: Icopdric Alginate-D2 (ice cream stabiliser emulsifier).
- DAYALAL VIJI & SONS, Ranjit Rd, Jamnagar 361001; Ph: 79473; Prop: Harilal Dayalal. Product: Essences. Brand Names: Butler, Butterfly.
- DEEP CHEM COMPLEX, Poddar Bhavan, Sarrafa Bazar, Bharatpur 321001, Rajasthan; Ph: 2757, Gram: Deplex; Partner: Hari Shankar, Ph (resi): 2888; Mgr: N M Goyal. Product: Adhesive. Brand Name: Deplex.
- DEEPAK NITRIC LTD, 9/10 Kunj Society, Alkapuri, Baroda. Product: Nitric Acid.
- DEVYA CHEMICALS, Hansaval Bungalow, Jawahar Chowk, Char Rasta, Maninagar, Ahmedabad. Product: Tri Sodium Phosphate.
- DINESH BROTHERS, 72/5 Maheshwar Dham, R B Mehta Marg, Ghatkopar (E), Bombay 400077; Ph: 322011; Prop: Manish Bhatt.
- DUMIT LABORATORIES, 13-B Monmotho Nath Ganguly Rd, Calcutta 700002. Products: Caustic Soda Lye, Chlorine Solution, Sodium Hydroxide, Hydrochloric Acid.
- DURGA TRADERS, Opp House Hold, Raopura Rd, Baroda. Product: Bleaching powder.
- ESSDEE CHEMOCRATS, 46 White Hall, August Kranti Marg, Bombay 400036; Ph: 8224527, Gram: Aishwarya, Tlx: 011-76700 KAGB IN; Mg Partner: R A Kagal. Products (Manufactured by Gist-brocades NV, Holland): Delvocid (food preservative), Delvotest, Fromase (microbial rennet), Maxilact (Lactose), Piccantase (fungal esterase-lipase).
- ETHO POLYMERS & CHEMICALS PVT LTD, Vasant Nivas, Senapati Bapat Marg, Dadar, Bombay 400028; Ph: 4302543, 4308487; Dir: N S Sammant.
- EXCEL CHEMICALS, CK 66/76B North Gate, Benaiabag, Varanasi 221001; Ph: 64367; Prop: T D Verma, Ph (resi): 44983; Mgr: Vijay Kumar. Product: Sulphuric Acid.
- FEXICO CHEM INDUSTRY, 16 Hardas Nagar Cloth Market, Bapunagar Char Rasta, Ahmedabad 380024. Product: Ferrous Sulphate.
- G K CHEMCO, 4/1A Krishna Ram Bose St, Calcutta 700004; Ph: 556529. Products: Caustic Soda Lye, Chlorine Solution.
- GUJARAT ALKALIES & CHEMICALS LTD, PO Petrochemicals 391346, Dist Baroda; Ph: 72681/2, Gram: Galworks, Tlx: 0175-216; Mg Dir: Dr P K Das; Sr Mktg Mgr: M M Mankad; Sr Sales Offr: A P Sheth. Products: Caustic Soda Lye and Flakes.
- HARSH CHEMICALS, 55 A P Tiwari Marg, Sakhipura, Ujjain 456001, Madhya Pradesh; Ph: 4751; Partner: Dr Paras C Maru. Products: Amyl Alcohol, Liquid detergents, Iodophore, Annato Colour, Iso-amyl alcohol, emulsifier, antifoaming agents.
- HAUER TRADING CO, SVN House, 90 C P Ramaswamy Aiyar Rd, Alwarpet, Madras 600018; Ph: 71795, Gram: Potential, Tlx: 041-7385 HAUR IN; Mg Partner: S V Narasimhan;

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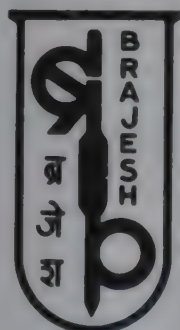
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HINDUSTAN AGROMETICS, 10 Dr Bhabha Rd, Nee-much 458441, Madhya Pradesh; Ph: 567, Gram: Higo; Partners: S K Sharma, Manish Sharma, K L Sharma, K S Sharma. Products: Harvestin, Higon, Shakti Spray.

HINDUSTAN ANTIBIOTICS LTD, Pimpri, Pune 411018; Ph: 86511-13, Gram: Antibiotic, Tlx: 145-279; Gen Mgr Mktg: V Ratnasabapathy; Asst Mktg Mgr: K S Shankaranarayana. (See also Pharmaceuticals).

IMKEMEX INDIA LIMITED, 304/305 Anna Salai, Guna Bldgs, Teynampet, PB No 1496, Madras 600018; Ph: 440092, Tlx: 041-7389.



INDIAN PETROCHEMICALS CORPORATION LIMITED, PO Petrochemicals Township 391345, Dist Baroda, Gujarat; Ph: 72441/2/3, 72839, 72856, Gram: Petcomplex, Tlx: 0175-364 & 365; Dir (Mktg): H S Shah; Dir (Finance): J S Bakshi; Dir (Ops): R Sethuraman; Exec Dir (Projects): A A Krishnan; Exec Dir: K N Venkatasubramanian; Chief Mgr (Polymers): S Chowdhary; Dep Mktg Mgr (Polymers): J B Kamat; Sr Mktg Offr (Polymers): M A Shaikh. Regional Offices -- Bangalore: Rallaram Bldg, 70 Mission Rd, -560027; Ph: 223801/2/3, Tlx: 0845-740; Bombay: Air India Bldg, Nariman Point, -400021; Ph: 2021674, 2023438, 2021731, Tlx: 011-4764; Calcutta: Chatterjee International Centre, 33-A Chowringhee Rd, -700071; Ph: 293618, 293545, Tlx: 021-2104; New Delhi: Ashoka Estate, 10th Floor, 24 Barakhamba Rd, -110001; Ph: 3315171, 3314289, 3313309, Tlx: 031-3175; Vadodara: Kirti Tower, Tilak Rd, -390001; Ph: 540172, 540569, 540669, 540823, Tlx:

0175-368. Product: Low density polyethylene compound. Brand Name: Indothene. INDO-FOREIGN CHEMICAL INDUSTRIES PVT LTD, C-6 Industrial Estate, Govindpura, Bhopal 462023; Ph: 62181, Gram: Internat; Mg Dir: Amarjeet Singh; Tech Dir: Dr Gurdev Singh. Regd Off: Dawar Brothers Bldg, Hamidia Rd, Bhopal. Products: Iodophores liquid detergent and soap.

INDUSTRIAL ADDITIVE TRADERS, C-55 Shivaji Park, New Delhi 110026; Ph: 593566; Prop: Vinod Kumar. Factory: 5C/97 New Rohtak Rd, New Delhi 110005; Ph: 5723826. Products: Ice cream stablizer, glucerline mono stearate (GMS). Brand Name: Stabiene.

INTERNATIONAL CORPORATION, 2217-A Gali Hinga Baig, Tilak Bazar, Delhi 110006. Product: Amyl Alcohol.

IRIS LABORATORIES (INDIA), Ramol Rd, Khokhra, Mehmedabad, Ahmedabad 380008; Ph: 369954. Product: Sodium Citrate.

ISHITA PHARMACEUTICALS, 6 Ashakunj Society, PB No 12001, Paldi, Ahmedabad 380007; Ph: 78560, 78218, Gram: Chemengers, Tlx: 121-539; Mg Partner: N Agrawal, Ph (resi): 78218; Partner: J Agrawal. Branch: 65/1 GIDC, Wadhwan 363030; Ph: 22416; Mgr: M B Chauhan. Product: Sodium Citrate.

JASMIN INDUSTRIAL ENTERPRISE, 52-54 Mint Rd, First Floor, Bombay 400001; Ph: 260013, 268917, Gram: Emmisary. Products: Milko tester reagents, imported chemicals, rare chemicals, preservative chemicals, laboratory chemicals.

JASUBHAI & CO, 205 Madan Zapa, Baroda. Product: Soda Bicarbonate.

JAYSHIV CHEMICALS, RDL P4 GIDC, Sector No 3, Valia Rd, Ankleshwar 393002, Dist Bharuch, Gujarat. Product: Sodium Phosphate.

KAILASH CHEMICALS, 2/A Patel Industrial Estate, Baroda 390004. Product: Tri Sodium Phosphate.

KANTILAL MANILAL & CO, 16 Princess St, PB No 2162, Bombay 400002. Product: Citric Acid, Ferrous Sulphate.

KHANNA FOOD & CHEMICAL INDUSTRIES, Nani Wala Bagh, Azadpur Industrial Area, Delhi 110033; Ph: 7113391; Gen Mgr: J D Khanna, Ph (resi): 5415294. Product: Orrange and Lime-lemon emulsion. Brand Name: Sheetal.

KOPSON PRODUCTS, 30 Sarojini St, T'Nagar, Madras 600017; Ph: 440607; Mg Partner: S S Koppikar, Ph (resi): 48334. Factory: B-17 Sidco Industrial Complex, Maraimalainagar 603209, Dist Chingleput. Products: Liquid detergent and soap. Brand Name: Twinkle.

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- LAXMI SCIENTIFIC INDUSTRIES, 25 Vikram Estate, Opp Sagar Society, Mehsana 384002, Gujarat; Partner: V D Chaudhari.
- LEWIS & DALE, A-9 Vijay Path, Jaipur. Product: Milk testing reagents.
- M C DALAL & CO, No 12 Pillayar Koil St, PB No 2346, Madras 600003; Ph: 33554, 39881, Gram: Acetone; Partners: Pravinchandra Shah, Kirti Kumar Shah, Suresh Kumar Shah, Kiran Kumar Shah, Ph (resi): 38402. Product: Laboratory chemicals.
- MAFATLAL DYES & CHEMICALS LTD, Fadia Chambers, 2nd Floor, Ashram Rd, Ahmedabad 380009. Product: Wetting agents.
- MAHENDRA CHEMICALS, Baroda Coop Indl Estate, Channi Rd, Baroda 390002; Ph: 21510; Mg Ptnr: B R Patel. Product: Sodium Meta Silicate.
- MUKTI CHEMICALS INDUSTRY, 718/19 GIDC Estate, Ankleshwar 393002, Gujarat. Products: Sodium Hexameta Phosphate, Sodium Phosphate.
- NAARDEN (INDIA) LIMITED, Maker Chamber IV, 10th Floor, Nariman Point, Bombay 400021; Ph: 240088, 240138, 240178, Gram: Naardenint, Tlx: 2175; Product Manager (Flavours): Dilip R Bedekar. Factory: Plot No 5, Saki Vihar Rd, Saki Naka, PB No 8920, Bombay 400072; Ph: 582306, 586339. Products: Essences, flavours and colours. Brand Name: Naarden.
- NASU CHEM, 12 Pawwala St, New Charni Rd, Bombay 400004. Product: Sodium Hexameta Phosphate.
- NATIONAL ORGANIC CHEMICAL INDUSTRIES LTD, Himalaya House, 38 Chowringhee Rd, Calcutta 700071; Ph: 292043, 292044, 292046. Products: Detergents, sanitisers, wetting agents. Brand Names: Teepol B-300, Glycol.



- NATIONAL PEROXIDE LIMITED, Neville House, J N Heredia Marg, Ballard Estate, Bombay 400038; Ph: 268071, Gram: Naperol, Tlx: 11-73372 BDM; President: Dr C J Dadachanji; Mktg Mgr: S S Ahluwalia. Products: Hydrogen Peroxide, Sodium Perborate. Brand Name: Naperol.

- NIKOS LABORATORIES UNIT II, Begum Bridge, Meerut 250001; Ph off: 74945, factory: 74353, Gram: Chemjaco; Mg Partner: A K Agarwal, Ph (resi): 73816. Products: Iso-Amyl Alcohol, Iodosan-D (sanitizer & detergent), Nikoclean/Teepol (liquid detergent), descaling solution, Nikocide.
- P C SHROFF & CO, Near Mandvi, Gandigate Rd, Baroda 390017. Product: Caustic Soda.
- PATEL ENTERPRISE, 78/84 Bapu Khote St, Room No 25, 3rd Floor, Bombay 400003; Ph: 332201. Product: Nitric Acid.
- PEST CONTROL (INDIA) PRIVATE LTD, Yusuf Bldg, Mahatma Gandhi Rd, Bombay 400001; Ph: 2041546, 2045471, Gram: Pestcil; Chmn & Mg Dir: N S Rao. Brand Name: Etoxide, Pest-O-Flash, Pestseal, Rodafrin, Sterifume, Termiseal.
- PHOENIX CHEMICAL WORKS PVT LTD, 4 Rajan House, Opp Century Bazar, Prabhadevi, Bombay 400025; Ph: 4228200, Gram: Water-glass; Dir: M A Kotibhaskar; Comm'l Mgr: Rajiv Kotibhaskar. Product: Sodium Meta Silicate.
- PIONEER CHEMICALS CO, 158 Senapati Bapat Marg, Bombay 400016; Ph: 4304010. Product: Sodium Meta Silicate.
- POLY FARM (P) LTD, 408 Tamarinost, Pancha Pakhadi, Shastri Marg, Thane. Product: Idophor Polysan.
- POLYCHEM CORPORATION, Vad Falia Ghee Kanda, Raopura, Baroda. Product: Formlin.
- POLYOLEFINS INDUSTRIES LTD, Mafatlal Centre, 11th Floor, Nariman Point, Bombay 400021; Ph: 2024226, Gram: Pilene, Tlx: 011-3478; Mktg Mgr: C R Gupte; Mgr, Chemicals Indent: L F Mascarenhas.
- PRAGATI INTERNATIONAL, Chemical Div, 1133 Gali Telian, Tilak Bazar, PB No 1732, Delhi 110006; Ph: 2523206, 2527100; Partners: P Maheshwari, V K Maheshwari, Ph (resi): 5720105. Products: Bleaching Powder, Caustic Soda, Hydrogen Peroxide, Citric Acid, Sodium Citrate, Sodium Benzoate, Benzoic Acid, Trisodium-Phosphate, Sodium Hexameta Phosphate.
- RADHA SALES CORPORATION, 304 AVG Bhavan, M-3 Connaught Circus, Middle Circle, New Delhi 110001; Ph: 351100, 344100, Gram: Holysoul, Tlx: 31-61558 SANG IN; Pres: Sant Sanganeria, Ph (resi): 673561. Product: Vanallin BP/USP Grade (Vanilla flavour).
- RAMESH CHEMICAL CO, 31-A Madan Park, Punjabi Bagh, New Delhi 110026; Ph: 513713, 526871, Gram: Dairytrade; Prop: Ramesh Chander. Contact Off: 345 Azad Market,

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Delhi 110006. Product: Amyl Alcohol.
RAVI BROTHERS, Deputy Ganj, Bulandhahr,
UP; Ph: 2561. Product: Amyl Alcohol.



RED CLUB PRODUCTS CORPORATION, 19/21 Shakti Nagar, Delhi 110007; Ph: 7112410, 7213212, Gram: Redclub; Mg Partner: Mrs Manmohan Kaur, Ph (resi): 539756, 5438756. Distributors: Sher-i-Punjab Trading Co, 1490-91 S P Mukerji Marg, Delhi 110006; Ph: 2529151, 2527819, 2913599, Gram: Crowncocks; Chief Exec: Sohinder Singh, Ph (resi): 539756; Mgr: V K Chopra. Products: Flavours and concentrates. Brand Names: Red Star, R C.

ROBIN CHEMICALS PVT LTD, 103 N M Mudaliar Rd, Aminjikarai, Madras 600029; Ph: 422154, 422806, Gram: Essence; Mg Dir: N Sekhran; Sales Mgr: S Muralidharan. Products: Flavours, essences.

ROLLA CHEMICALS, 2/811-812 Ring Rd, Near Sagrampura, Bus Stand, Udhna Darwaja, Surat 395002; Ph: 45543, 47597; Ptnr: Prakash H Shroff. Products: Amyl Alcohol, liquid detergents, etc.

SAGAR CHEMICALS, K-73/2 GIDC Estate, Highway Rd, Mehsana 384002, Gujarat; Ph: 20922, 22068; Mg Partner: S K Rayaka, Ph (resi): 22134. Product: Amyl Alcohol.

SAMIR TECH-CHEM INDUSTRIES, 350 GIDC Makarpura, Baroda 390010. Product: Formalin.

SARABHAI M CHEMICALS, Gorwa Rd, PB No 80, Baroda 390007; Ph: 82821, Gram: Samchem, Tlx: 473; Mktg Controller: N J Kakani. Regl Offices— Bombay: A-Z Indl Estate, G Kadam Marg, PB 16319, -400013; Ph: 392061; Calcutta: (2/1/4 Deb Lane), CIT Rd, Scheme LII, Entally, -700014; Ph: 446923; Madras: 123 Angappa Naicken St, G T, -600001; Ph: 31307; New Delhi: 69/5A Shivaji Marg, -110015; Ph: 534188. Products: Milk testing reagents, lab chemicals, etc.

SATYAM PHARMA-CHEM PVT LTD, 23 J K Chambers, 77/83 Nagdevi St, Bombay 400003; Ph: 337136. Product: Cobalt compounds.

SAURASHTRA CHEMICALS, Birlasagar, Porbandar, Gujarat. Product: Soda Bicarbonate.

SEEMA CHEMICALS, Raipur Gate, Baherampura, Ahmedabad. Product: Idophor Polysan.

SESU TRADING CORPN, Sai Chambers, 4th Floor, 367/69 Narsi Natha St, Bombay 400009; Ph: 320832. Product: Butylated Hydroxy Amisole.



SHREE GANPATI CHEMICALS, 50-A Jambheshwar Market, Hisar 125001; Ph: 2740; Chief Exec: Om Prakash Jain, Ph (resi): 2658. Products: Deodorants, detergents, disinfectants and sanitizers. Brand Name: Doctor.

SHRI TRADING CORPORATION, Ghudiali Pole, Near Jain Temple, Baroda 390001 — H R Shah. Product: Sodium Hexameta Phosphate.

SHRIRAM CHEMICALS, 18 Sarvoday Society, Near College Crossing, Petlad 388400, Gujarat. Product: Ferrous Sulphate.

SIDDHI CHEMICALS, Bombay House, 4th Floor, Block 9, Ashanagar, Navsari 396445, Gujarat. Product: Caustic Soda, Soda Ash, Sodium Phosphate, Sodium Hexameta Phosphate.

SOLUBLE SILICATE INDUSTRY, Plot No 134, H Rd, GIDC, Nandesari 391340, Dist Baroda, Gujarat. Product: Sodium Meta Silicate.

SONAROME CHEMICALS PVT LTD, C-136 Peenya Industrial Area, II Stage, Bangalore 560058; Ph: 365556, Gram: Sonarex, Tlx: 845-696; Mg Dir: Mrs R Gulhati; Dirs: T S Gulhati, P R Singh Rana. Product: Flavours. Brand Name: Sonarex.

STANDARD ALKALIES, Stanrose House, Near Prabhadevi Rd, Bombay 400025. Product: Caustic Soda.

STANDARD CHEMICALS, Kalson House, Anand 388001, Gujarat. Product: Wetting agent.

SUNDAR CHEMICALS, 13 Mooker Nallamuthu St, Madras 600001; Ph: 24540, 25237, 423465, Tlx: 041-6431 SUND IN.

SUPER PRODUCTS COMPANY, C-157 Naraina Indl Area, Phase I, New Delhi 110028; Ph: 502571, 5412867. Product: Caramel.

SURFOCHEM INDUSTRIES, 3 Nilkanth Sadan, Peru Baug, Aarey Rd, Goregaon (E), Bombay 400063; Ph: 694402; Prop: Smt Saroj Naik; Tech Mgr: Dhirubhai Naik. Products: Detergents and deodorants. Brand Names: Acidet, Algisol, Aquarin, Sudet, Sudol.

SURUCHI CHEMICALS, 2/120 MIG Flats, Kareli Baugh, Baroda 390001. Products: Tri Sodium Phosphate, Sodium Hexameta Phosphate, Nitric Acid, Bleaching powder.

SWAROOPA CHEMICALS, 4-4-157 Mahankali Temple St, Secunderabad 500003; Ph: 74106, 79513; Mg Partner: V Srinivas Rao.

TATA CHEMICALS LIMITED, Mithapur 361345, Gujarat; Ph: 21, Gram: Tetakem, Tlx:

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Phones office: 74945, resi: 73816

161-247 TCMP IN; Gen Mgr (Works): M K Vadgama; Dep Gen Mgr (Chemical Works): B M Saha; Production Mgr: K K Krishnamoorthy; Research Mgr: K H Parekh. Products: Common Salt, Soda Ash. Brand Name: Diwali.

TEXPHOS, 101 M G Rd, Fort, Bombay 400001. Product: Sodium Hexameta Phosphate.

TIRUPATI CHEMICALS, Ranjan Bldg, 1st Floor, P L Sharma Rd, Meerut; Ph: 77699, 72694. Product: Amyl Alcohol.

UNION ACID & CHEMICAL CO, 151 Mittal Court, Nariman Point, Bombay 400021; Ph: 225938, 244030. Product: Nitric Acid.

UNIVERSEL DISTRIBUTORS, 619 Yash Kamal Bldg, Tilak Rd, Baroda 390005. Product: Citric Acid, Sodium Sulphite, Caustic Soda (detergent), Soda Ash, Sodium Citrate.

V R CHEMICALS, Savitri Bldg, 56 Lal Bahadur Shastri Marg, Agra Rd, Sion (West), Bombay 400022; Ph: 483976, Tlx: c/o 011-76159 MRVL IN; Mgr Partner: R C Gandhi. Products: All types of chemicals, pharmaceutical raw materials, drugs, solvents and aromatic chemicals. Also exclusive agents of Lucas Meyer GmbH & Co for Soyabean Lecithin and Indenting agents of May & Baker, UK, for Anti-Oxidant-Embanox BHA & TBHQ.

VENUS ENTERPRISES, F/78 Banner Industrial Estate, Opp Some Textiles, Rakhial Rd, Ahmedabad 380023; Ph: 366127, 386901. Product: Amyl Alcohol.

VESCO PRODUCTS COMPANY, THE, 66 Ezra St, Calcutta 700001; Ph: 267878, Gram: Buttercol; Mgr Partners: Seva Nath Pathak, B N Pathak; Partner (factory-in-charge): V Y N Pathak, Ph: 45-3716. Branch: 1403/1 Tilak Bazar Chowk, Delhi 110006; Ph: 2514407; Mgr: H W Pathak. Products: Colours and essences.

VIJAY CHEMICAL HOUSE, 57 Sutar Chawl, Bombay 400002. Product: Formlin.

VIJAY CHEMICALS, 105 Bombay Samachar Marg, 1st Floor, Room No 14, Fort, Bombay 400023. Product: Algicide L.

VIKRAM CHEMICAL INDUSTRIES, Dairy Rd, Behind Dr Lalbhai Hospital, Mehsana 384002, Gujarat; Ph: 3680; Prop: I V Desai. Product: Amyl Alcohol.

WHEELERS CHEMICALS, 229 Wheel House, Fatsa Pole, Gandhi Rd, Ahmedabad. Product: Idophor Polysan.

YOGI TRADERS, F/6 Gandhi Shopping Centre, Maharashi Dayanand Rd, Anand 388001. Products: Sodium Sulphite, Sodium Meta Silicate.

Late Additions

ASIATIC OXYGEN & ACETYLENE CO LTD, 8, B B D Bag East, Calcutta 700001; Ph: 204247, 204241, 204259, Gram: Asioxygen, Tlx: 021-3527; Pres: P Kishore. Branches: Aurangabad, Barauni, Howrah, Kumhari, Nagpur, Tinsukia. Product: Liquid Nitrogen.

GUJARAT POLYMERS & CHEMICALS, Ami Apt, Ground Floor, Off Khanderao Market, Baroda. Product: Wetting agent.

MERIND LIMITED, New India Centre, 17 Cooperage Rd, Bombay 400039; GPO Box 10081, Bombay 400001; Ph: 2020676, Gram: Merindby, Tlx: 011-3459; Gen Mgr, Exports & Chemical Sales: Dr J N Dwivedi; Mgr: S K Khanna; Mgr-Operations: Dr K K Agarwal. Factory: Goregaon-Mulund Link Rd, Bhaydup, Bombay 400078; Ph: 5612586, 5618432. Product: Vitamin B12.

NAVIN DYE CHEM CORPORATION, Block No 2, Apt 118, MIG Scheme, Kareli Baug, Baroda. Product: Bleaching Powder.

PARIKH ACID CHEM INDUSTRIES, Bachubhai Estate, Near Sonal Ice Factory, Hemco Naroda Rd, Ahmedabad 380025. Product: Caustic Soda.

PRAGATI CHEMICALS, Nacharam Industrial Area, Hyderabad 501507. Product: Sodium Citrate.

PULLAMMA INDUSTRIES, 20 North Development Plot, Industrial Estate, Guindy, Ekkaduthangal, Madras 600097; Ph: 431414.

RAJIV & ASSOCIATES, 66 Princes St, Bombay 400002; Ph: 254170, 312376; Prop: Rajiv Gandhi, Ph (resi): 8227802; Mgr-Pharma/Vet Sales: Sanjiv Gandhi.

ROCHE PRODUCTS LTD, Vitamin Div, 28 Pt M M Malviya Rd (Tardeo Rd), PB No 7901, Bombay 400034; Ph: 4945890, Gram: Hofroche, Tlx: 75169, 76753; Gen Mgr: Dr V M Adhikari; Asst Mgr: Dr P P Vitkar. Distributors: Voltas Ltd. Products: Vitamins.

V B CHEM INDUSTRIES, Ghee Kanta, Vadi Falia, Behind Raopura Tower, PB No 75, Baroda 390001. Products: Tri Sodium Phosphate, Algicide L.

VARDHMAN CHEMICALS PVT LTD, Parekh Mahal, 80 Veer Nariman Rd, Churchgate, Bombay 400020. Product: Pure Salt.

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Buyer's Guide

This handy Buyer's Guide lists suppliers of chemicals by products under major heads and sub-heads. The address and other details of each of these companies can be obtained from the main listing.

DETERGENTS

Associated Aromatics
Brajeshlab
Harsh Chemicals
Indo-French Chemical
Industries Pvt Ltd
Kopson Products
National Organic Chemical
Industries Ltd
Rolla Chemicals
Shree Ganapati Chemicals
Surfochem Industries
Universal Distributors

Caustic Soda Lye

Ashis Industrial Corporation
Choksi Dye Chem
Dumit Laboratories
G K Chemco
Gujarat Alkalies & Chemicals
Limited
P C Shroff & Co
Parikh Acid Chem Industries
(Late additions)
Siddhi Chemicals
Standard Alkalies

Hydrochloric Acid

Ashis Industrial Corporation
Dumit Laboratories

Nitric Acid

Bombay Chemicals
Chemical Corporation of India
Deepak Nitric Ltd
Patel Enterprises
Suruchi Chemicals
Union Acid & Chemical Co

Soda Ash

B Patel & Co
Chokshi Dye Chem
Dinesh Brothers
Siddhi Chemicals
Tata Chemicals Ltd
Universal Distributors

Sodium Bicarbonate

Jasubhai & Co
Saurashtra Chemicals

Sodium Hydroxide

Dumit Laboratories

Sodium Meta Silicate

Mahendra Chemicals
Phoenix Chemical Works (P) Ltd
Pioneer Chemicals Co
Soluble Silicate Industry
Yogi Traders

EMULSIFIERS & STABILISERS

Citric Acid

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Citric India Ltd
Citurgia Biochemicals Ltd
Kantilal Manilal & Co
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Sodium Citrate

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Iris Laboratories (India)
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Sodium Hexameta Phosphate

A Chocksey Chemical Industries
Ashis Industrial Corporation
Mukti Chemicals Industry
Nasu Chem
Shri Trading Corporation
Siddhi Chemicals
Suruchi Chemicals
Texphos

Sodium Phosphate

Jayshiv Chemicals
Mukti Chemicals Industry
Siddhi Chemicals

Tri Sodium Phosphate

A Chocksey Chemical Industries
Ashish Chemicals
Devya Chemicals
Kailash Chemicals
Suruchi Chemicals
V B Chem Industries
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 M C Dalal & Co
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 Suruchi Chemicals

Chlorine Solution

Ashis Industrial Corporation
 Dumit Laboratories
 G K Chemco

Iodophors Compound

Asian Catalyst & Chemicals
 Associated Aromatics
 Bhavna Chemicals
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 Harsh Chemicals
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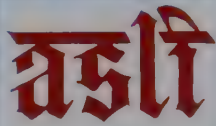
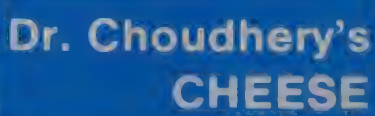
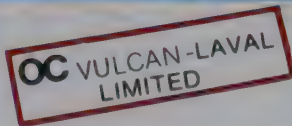
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AGRO-CONSULTANTS (P) LTD, G & H Blocks, First Floor, 'Vandhna', 11 Tolstoy Marg, New Delhi 110001; Ph: 3315050, 3312421, Gram: Harvester espidel, Tlx: 31-3014; Mg Dir: S K Chakravarty, Ph (resi): 670819.

AHMEDABAD CONSULTANCY GROUP (PVT) LTD, THE, M5-30/236 Shastrinagar, Ahmedabad 380013; Ph: 400960, Gram: Consultus; Dir: Dr R N Rai.

AMUL RESEARCH AND DEVELOPMENT ASSOCIATION (ARDA), c/o Kaira Dist Coop Milk Producers' Union Ltd, Anand 388001; Ph: 3402, Gram: Amuldairy; Sec: V H Shah.



ASHISH TECHNICAL SERVICES PRIVATE LIMITED, Cheese House, B-1 Zamrocdpur (Nehru Market), Opp LSR College, New Delhi 110048; Ph: 6432632, Gram: Makhanchor; Mg Dir: Dr A K Choudhery, Ph (resi): 6417802, 6416768; Tech Dir: S C Choudhery, Ph (resi): 6416768 — Consultants to food and dairy industry.

B K S JAIN & ASSOCIATES, 7 Neeltarang, 208 Savarkar Marg, Bombay 400016; Ph: 463887; Prop: B K S Jain — Marketing, Management & Agro Consultants.

BEDEKAR, B R, 65/7 Erandawne, Law College Rd, Poona 411004; Ph: 51621.

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE (BAIF), Kamdhenu, Senapati Bapat Marg, Pune 411016; Ph: 52621-2-3, Gram: Baifon, Tlx: 0145-283; Chief Exec: Dr D S Gorhe; Sec: M P Marathe.

BHAT, S K, 765, First Cross, Indiranagar, First Stage, Bangalore 560038 — Management Consultant.

BLUE CROSS CONSULTANTS, Q-41 Rajouri Garden, DELHI 110027; Ph: 502929, 2918037, Gram: Bluecross, Tlx: 31-3969 NSM IN; Chief Tech Dir: Dr A P Sachdev. Branch: c/o Prescription, 25 Air Conditioned Market, Tardeo,

Bombay; Consultant: Dr Rajeshwara Singh, Ph: 4947180 — Tech & Mgmt Consultants. **CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE**, Cheluvamba Mansion, Mysore 570013; Ph: 22660, Gram: Foodsearch; Dir: Dr B L Amla.

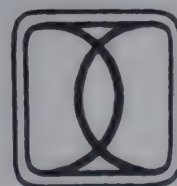
CHANAKYA CONSULTANTS, Metro Commercial Centre, High Court Marg, Navrangpura, Ahmedabad 380009; Ph: 448130, 403855, Gram: Chanakya; Chief Exec: Markand Bhatt, Ph (resi): 78955.

CONE CENTRE, Navketan, Central Avenue Rd, Chembur, Bombay 400071; Ph: 5551878; Prop: P P Deshpande.

D-TECH CONSULTANTS, 30/3 Double Storey, Ashok Nagar, PO Tilak Nagar, New Delhi 110018; Ph: 5413949; Mg Partners: S C Malik, R Trehan, Ph (resi): 6432371 — Consultants for dairy and soya foods.

DAIRYING & ALLIED CONSULTANCY SERVICES, Kothi No 51, Phase VII, Mohali (SAS Nagar) 160061, Chandigarh; Ph: 87993; Chief Exec: G B Singh Kahlon.

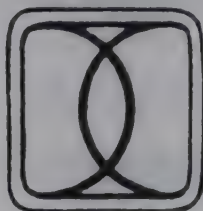
DEVCONSULT, A-144/2 J B Nagar, Bangalore 560075; Ph: 565509, Gram: Devconsult, Tlx: 0845-696 PCD; Prop: A Devariya.



DINESH CONSULTANCY PRIVATE LIMITED, 5 Mehta House, 2nd Floor, 36 Pandita Ramabai Rd, Bombay 400007; Ph: 8281435, Gram: Busy-brains, Tlx: 011-4056 TRAD IN; Dirs: Dr J V Parekh, Ph (resi): 6405358, R V Shah, D C Kaji — Consultants for Dairy Food Products, Poultry and Allied Industries. **DWARKANATH**, P K, 85, IIIrd Cross Rd, Mangala Bhavan, Sri Ramapuram, Bangalore 560021; Ph: 366056.

GANESH ASSOCIATES, 17 Karaneeswarar Pagoda Rd, San Thome, Madras 600004; Ph: 72529; Chief Consultant: Dr R Ganesh — Livestock, Poultry and Feed Consultant.

GAZULA, DR R G, Nutritionist-cum-Production Mgr, Krishna Coop Sugar Factory Ltd, Feed Mill Div, Rethare Bk, Tal Karad 415108, Dist Satara; Ph: 2306, 53 Shivajinagar.



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HINDUSTAN LIVESTOCK SALES CORPORATION, 80 Hardwar Rd, PO IIP, Mohkampur, Dehra Dun; Ph: 25853, Gram: Atma, Tlx: 0595-270; Pres: Dr A S Bindra.

INDIAN DAIRY & ALLIED SERVICES PVT LTD, Ludhiana Rd, PB No 53, Malerkotla 148023, Punjab; Ph: 2401, 2410, Gram: Idasa; Mg Dir: H S Dureja, Ph (resi): 2469 — Consultants & Milk Procurement Organisers.

INDIAN INSTITUTE OF MANAGEMENT, Vastrapur, Ahmedabad 380015; Ph: 407241, Gram: Indinman, Tlx: 121-351 IIMA IN; Dir: Dr N R Sheth.

INDIAN VETERINARY RESEARCH INSTITUTE, Izatnagar 243122, UP; Ph: 74305, Gram: Vetex; Dir: Dr P N Bhat.

INSTITUTE OF MARKETING & MANAGEMENT, 62-F Sujan Singh Park, New Delhi 110003; Ph: 699224-5, 697295, 690864, 693023, Tlx: 31-3643 IMM IN; Sec-Gen: Dr Jagjit Singh.

INSTITUTE OF RURAL MANAGEMENT, PB No 60, Anand 388001; Ph: 3100, 3101, Gram: Irma, Tlx: 0172-207; Dir: P S Appu.

KJSJ FOODS & SERVICE PVT LTD, 7/87 Vishnu Prasad, Mahant Rd, Vile Parle East, Bombay 400057; Ph: 6143248, Gram: Admanial, Tlx: 78029; Tech Dir: S R Javalgekar — Consultants for dairy products manufacturing equipments.

KHURDODY TECHNICAL SERVICES PRIVATE LIMITED, 12-A Darbhanga Mansion, Carmichael Rd, Bombay 400026; Ph: 4922568, Gram: Dairytech, Cumballa Hill, Bombay 400026, Tlx: 011-4787 SPA IN; Chmn: N D Khurody — Dairy and Food Consultants.

KIRLOSKAR CONSULTANTS LTD, 917/19A Shivajinagar, Fergusson College Rd, PB No 803, Pune 411004; Ph: 56495, 55557, 54211, Gram: Kicons, Tlx: 0145-226; Mg Dir: D V Tikekar; Assoc Vice-Pres, Farm Services & Agri Studies Div: Dr S G Sapre. Branches: Ahmedabad, Bangalore, Bombay. Services: Project reports on dairies/dairy products, diagnostic studies.

KONNOTH CONSULTANCY SERVICES, 60 Tara Kunj, Sindhi Society, Chembur, Bombay 400071; Ph: 525805; Consultant: J J Konnoth.

KRISHAN MATHUR & ASSOCIATES, 2659 Roshanpura, Nai Sarak, Delhi 110006; Ph: 276943; Chief Tech Exec: Krishan Mathur, Ph: 6441850; Mktg Exec: Suresh Chandra — Consultants for milk handling and processing equipment.

LACS (Livestock Advisory & Consultation Services), PB No 2143, Delhi 110007; Ph: 502929, 2918037; Tech Consultants: Dr A P Sachdev, Amit Sachdev.

LALL, DR J M, D-II/121 Kaka Nagar, New Delhi — Livestock Health and Mgmt Consultant. MANN DAIRY & FOOD SERVICES, F-220 Vikas Puri, New Delhi 110018; Ph: 5432878; Prop: S S Mann — Consultancy for manufacture of milk and cereal products.

MARWAHA, DR D R, 24-B Syed Amir Ali Ave, Calcutta 700017; Ph off: 444939, 442123, resi: 442646 — Livestock and poultry consultant.

NATIONAL COOPERATIVE DEVELOPMENT CORPORATION, 4 Siri Institutional Area, Behind Hauz Khas, New Delhi 110016; Ph: 656218; Consultant (Dairying): Dr S P Sharma, Ph (resi): 511824.

NATIONAL DAIRY DEVELOPMENT BOARD, Anand 388001; Ph: 3002 to 3011, Gram: Dairy-board, Tlx: 0172-207; Sec: Dr (Miss) Amrita Patel.

NATIONAL DAIRY RESEARCH INSTITUTE, Karnal 132001; Ph: 4293, Gram: Dairysearch; Dir: Dr R Nagarcenkar; Jt Dir: Dr R K Patel, Ph: 2621; Head, Dairy Ext Div: Dr R L Kherde, Ph: 2847.

NATIONAL INSTITUTE OF RURAL DEVELOPMENT, Rajendranagar, Hyderabad 500030; Ph: 48001, Gram: Gravik; Dir-Gen (Incharge): J M Lyngdoh, Dep Dir-Gen.

NATIONAL INSTITUTE OF WASTE RECYCLING TECHNOLOGY, A-18 Juhu Apts, Juhu Rd, Santa Cruz (W), Bombay 400049; Ph: 543517; Dir: Dr T M Paul. Services: Pollution control on farms.

PANDA, DR J N, Vill Kuchipali, Via Ghess 768034, Sambalpur Dist, Orissa — Livestock consultant.

PANDYA, PROF A C, 8 Shripalli Society, Manjalpur, Vadodara 390011 — Dairy engineering consultant.

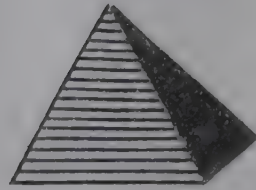
PRAKASH CONSULTANCY SERVICES, Plot No 3583, M-12 Anna Nagar East, Madras 600102; Ph: 615455; Pres: Dr D V R Prakasha Rao, Ph (resi): 617316.

PROJECT ENGINEERING SERVICES, C3/3 Rajouri Garden, PB No 6561, New Delhi 110027; Ph: 5417510, Gram: Prosperity; Mg Dir: Subash Chandra. Services: Installation of refrigeration, dairy and food processing plants.

RANAWAT & ASSOCIATES, E-64, Sector 8, Noida, Dist Ghaziabad, UP; Ph: 805-3828; Chief Consultant: S S Ranawat — Consultant to dairy and food industry.

RUBY AGRO-CONSULTANTS, Ruby Bldgs, Flat 2, 1st Floor, E V R St, Erode 638002, Tamil Nadu; Ph: 70065; Prop: Dr C R Shridhar — Project consultancy.

SCIENTIFIC FARM CONSULTANCY SERVICE (P) LTD (SCIFON), MIG D-6, Foreshore Estate,



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SOM, DR R N, Regent Park, Govt Housing Estate, Block 9, Suit 2, Calcutta 700040; Ph: 426023—Animal feedstuffs consultant.

SOMANI INTERNATIONAL CORPORATION, 1510 Maker Chamber V, Nariman Point, Bombay 400021; Ph: 223543, 223549, 230344, Tlx: 011-4050 SIC IN; Pres: Vinay R Somani, Ph (resi): 296705, 317532 — Food processing and packaging machinery.

SRIKRISHNA, DR M, No 8 Kelleys Rd, Madras 600010; Ph: 653017, 653125 — Dairy consultant.

SUPREME ENTERPRISES, 1 Fuel Depot, Gole Market, New Delhi 110001; Ph: 343299; Consultant: Bharat Bhushan — Ice cream specialist and manpower mgmt consultant.

TANEJA, DESHPANDE & ASSOCIATES, 12 Apurva, 5 Napean Sea Rd, Bombay 400036; Ph: 8124214; Partners: Sumant Taneja, P P Deshpande, N R B Garda. Branch: Bangalore. Services: Management consultants.

TATA ECONOMIC CONSULTANCY SERVICES, Orient House, Mangalore St, Ballard Estate, Bombay 400038; Ph: 267621, Gram: Tecs-tata, Tlx: 011-2618, 011-2731; Exec Dir: D N Poonegar.

TEPE CONSULTANTS (P) LTD, 203A Ashok Hotel, Chanakyapuri, New Delhi 110021; Ph: 607719, Gram: Hedron, Tlx: 031-63185; Mg Dir: K K Khosla, Ph off: 675503, resi: 634666, 636507.

TROPICAL CONSULTANCY SERVICES, c/o Dairy-land, Varvada Farm, PO Talasari 401606, Dist Thane, Maharashtra; Ph: 52, 78 Talasari (Dahanu Ex); Consultant: R D Patel—Dairy production & processing consultant.

UNICORN ENGINEERS & CONSULTANTS, 13/1 Rasulpura, PB No 1687, Secunderabad 500003; Ph: 821122, Gram: Unimach, Tlx: 0425-6646; Mg Dir: Bhanu Sanghani, Ph (resi): 73696; Sr Exec: R Sanghani, Ph (resi): 820575; Mktg Mgr: D Vijay Kumar Rao — Consultancy on turnkey basis for all food projects.

VIKRAM ENTERPRISES PVT LTD, A-47 Friends Colony East, New Delhi 110065; Ph: 635371; Mg Dir: Y D Sood, Ph (resi): 637457.

WEIGAND INDIA PVT LTD, 22-D Nizamuddin East, New Delhi 110013; Ph: 621908, Tlx: 031-62312; Mg Dir: B P S Puri, Ph (resi): 389557 — Dairy and food consultant.

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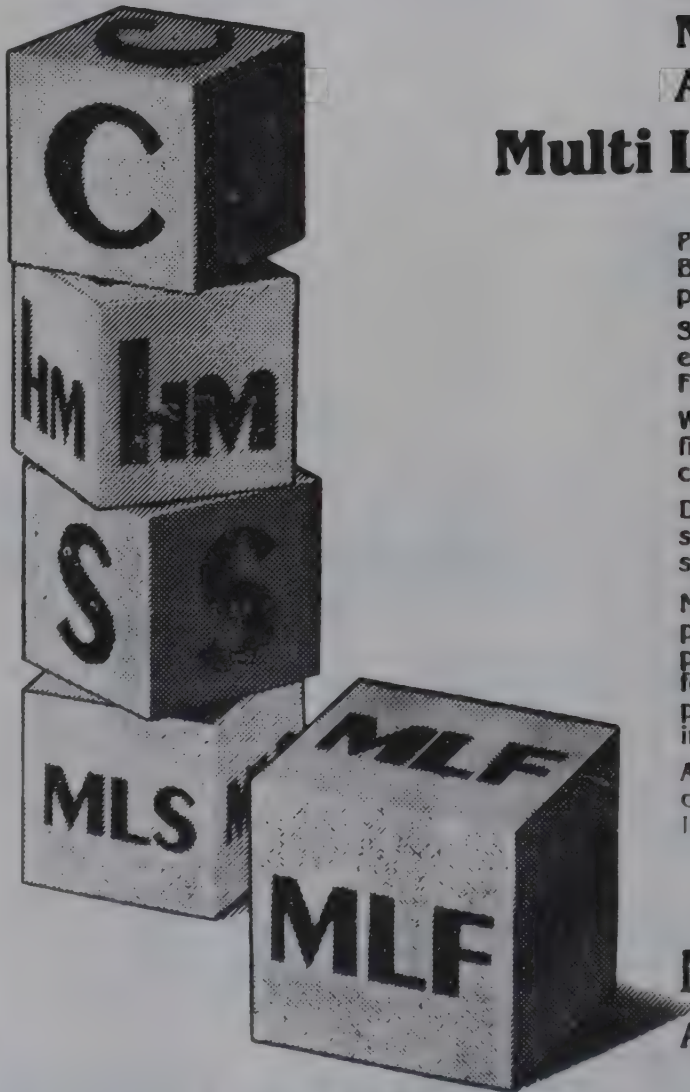
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Dairy Consumables

Listed below are manufacturers/suppliers of dairy consumables, including spares, packaging materials, plastic films, bottles and laboratory equipment. It is followed by a Buyer's Guide.



A-1 PLASTICS, 312 Churchgate Chambers, 5 New Marine Lines, Churchgate, Bombay 400020; Ph: 295333, 294933, 255672, Gram: Houseware, Tlx: 011-6332 PEXO IN; Mg Partner: Kishore S Chheda, Ph (resi): 4122537, 4123356; Mgr: M X Sequeria, Ph (resi): 622710; Business Execs: Robert C Fernandes, K Raghunathan; Regl Execs: Raji Sam (Bangalore), G Raju (Delhi-Ph: 621248). Factory: 4 Steelmade Industrial Estate, Marol Vill, Andheri (E), Bombay 400059; Ph: 6324756, 6364874. Products: Dairy plastic crates. Brand Name: Prince.

AJANTA TRADERS (REGD), 9 Vishal Centre, Hamidia Rd, Bhopal 462001; Ph: 74723; Prop: Bholanath Jain. Products: Aluminium caps, plungers, shaking stands.

AJIT GLASS WORKS PVT LTD, Swami Vivekanand Rd, Jogeshwari, Bombay 400102; Ph: 572293-94, 620027, Gram: Ajitworks; Mg Dir: A T Gidwani; Dir: P I Gidwani. Product: Glass bottles.

AMI ENTERPRISES, 84 Bhuleshwar Rd, Bombay 400002; Ph: 365221, 382706, Tlx: 5256; Mg Partner: Mukul H Kothari. Products: Tower packagings and precision plastics.

AMI POLYMERS, 2 Thanawala Lane, Vile Parle (E), Bombay 400057; Ph: 6346616, 6347270; Partner: Manoj Akkad.

ANAND POLYROTEX, B-48 New Empire Indl Estate, Kondivita Lane, Opp J B Nagar, Andheri (E), Bombay 400059; Ph: 6324463, 6301842; Chief Exec: N K Mehta. Product: Film.

ANJNA TRADING CORPORATION, Vohra Colony, Mahavir Marg, Polson Dairy Rd, Anand 388001; Ph: 4059, 7609; Prop: Suresh M Patel. Products: Carbon seals, gaskets, etc.

ANSAT PLASTICS PVT LTD, B-6/68 Safdarjung Enclave, PB No 4919, New Delhi 110029; Ph: 608115, Tlx: 3558; Dir (Comm): S G Vaccher. Plant: Alwar (Rajasthan). Product: Plastic film.

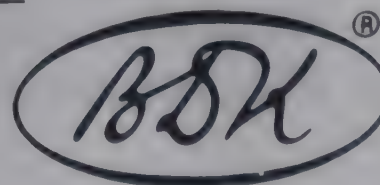
APEX FLEXIBLES, C-143 Naraina Industrial Area, Phase I, New Delhi 110028.

ASE PACK (P) LTD, KF-32 Kavi Nagar, Ghaziabad 201001; Ph: 47272; Dir: Rakesh Goyal. Product: Plastic films and pouches/bags.

ASSOCIATED GLASS INDUSTRIES LTD, Varadanagar, Kukatpally, Hyderabad 500018; Ph: 262371; Chief Exec: C V Krishnaiah, Ph: 261024. Product: Glass bottles.

ATLAS LAMINATE INDUSTRIES, 525/526 Near Grid Station, Industrial Area, Odhav 362415, Dist Ahmedabad; Ph: 367032, Gram: Atlas. Products: Hessian bags.

BASF INDIA LIMITED, Maybaker House, Sudam Kalu Ahire Marg, PB No 19108, Bombay 400025; Ph: 4930703, Gram: Basfindia, Tlx: 11-71538 BASF IN; Mg Dir: P M Thampi; Dir (Plastics & Fibre Raw Materials): M Bala Subramaniam; Mktg Mgr (Plastics Div): R N Ganjoo, Ph (resi): 548942; Production Mgr (Plastics): K S Katiyal, Ph (resi): 5515318. Branches — Ahmedabad: Karaka Bldg No 1, Ashram Rd, Nawrangpura, -380009; Ph: 407074; Calcutta: 13-A Govt Place East, -700069; Ph: 233883, 235869; Madras: Garuda Bldg, 46 Cathedral Rd, -600086; Ph: 83562; New Delhi: 7 Basant Lok, Vasant Vihar, -110057; Ph: 677597, 677099, Tlx: 62063. Products: Styropor, Thermocole.



B D K VALVES PRIVATE LIMITED, Kutchi House, Jayachamaraj Nagar, Hubli 580020, Karnataka; Ph: 63638, 67105, Gram: Unifloval, Tlx: 0865-232; Mg Dir: Bharat B Khimji;

See also LATE ADDITIONS at the end of the listing



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BABU LALL & SON, 629 New Mandir Rd, 126/78 Nangloi, Delhi 110041; Ph: 772501, 592141; Partners: Babu Lall Saraf, S R Saraf.

Products: Synthetic filter fabrics/bags.

BALLARPUR INDUSTRIES LTD, Thapar House, 124 Janpath, New Delhi 110001; Ph: 310520, Gram: Spiritual, Tlx: 031-3845; Mg Dir: L M Thapar; Gen Mgr (Paper & Sty Sales): N K Rallan. Products: Paper Boards. Brand Names: Bilt Sunlit, Crystal Cote, Sunshine, Super Lucky, Three Aces.

BALMER LAWRIE & CO LTD, Containers Div, 149 Jackeria Bunder Rd, Sewri, Bombay 400015; Ph: 4132421-23; Tlx: 76030; Mg Dir: S K Sinha. Product: Milk containers.

BATRA ASSOCIATES PVT LTD, Plastics Div, 12/4 Mathura Rd, Faridabad 121003; Ph: 5429, 5561-63, Gram: Stoves, Tlx: 343-311 KUKU IN, 31-62393 BAPL IN; Mg Dir: A L Batra; Mgr: Narinder Batra. Regd & Head Office: E-42/3 Okhla Indl Area, Phase II, New Delhi 110020. Products: Coextruded film.



**BEARDELL
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LIMITED**

BEARDELL INSULATION LIMITED, DhanNur Bldg, 15/16 Sir P M Rd, PB No 432, Bombay 400001; Ph: 2863307, 2862510, Gram: Beardsell, Tlx: 011-4333 MBL IN; Pres: B Roy, Ph: 2860803. Regd Off: 47 Graemes Rd, Madras 600006; Ph: 473296, 470900, 470381, Gram: Beardsell, Tlx: 041-7675. Branch Offices--Ahmedabad: 3110 Kapasia Bazar, Railwaypura PO, PB No 1063, -380002; Ph: 337145, 382433, Gram: Beardsell, Tlx: 021-570; Bangalore: 12/3 Dickens Rd, PB No 4255, -560042; Ph: 52988, Gram: Beardsell, Tlx: 0845-8102; Bombay: DhanNur Bldg, 15/16 Sir P M Rd, PB No 432, -400001; Ph: 2863307, 2862510; Calcutta: A-3 Gillander House, 8 Netaji Subhas Rd, PB No 460, -700001; Ph: 206887, Gram: Beardsell, Tlx: 021-3224; Cochin: 38/308-A T D Rd, Ernakulam, -682035; Ph: 367474, Gram: Beardsell; Coimbatore: 1212 Trichy Rd, PB No 3760, -641018; Ph: 25501, Gram: Beardsell, Tlx: 0855-389; Madras: 47 Moore St, -600001; Ph: 22758, 28376,

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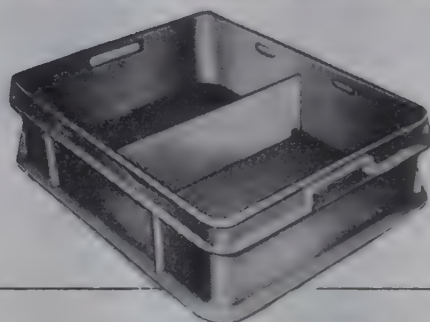
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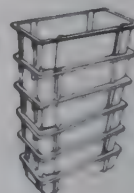
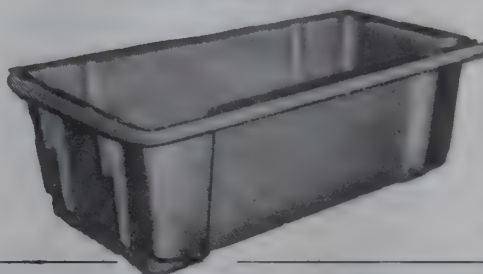
WITHOUT PARTITION

2988

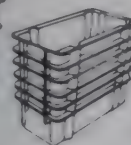
TUB POUCH CRATE

DIMENSIONS IN MM			
	L	B	H
INNER	427	335	124
OUTER	471	378	137

For 20 pouches of
1/2 ltr. or 10 pouches of 1 ltr.



RESTING



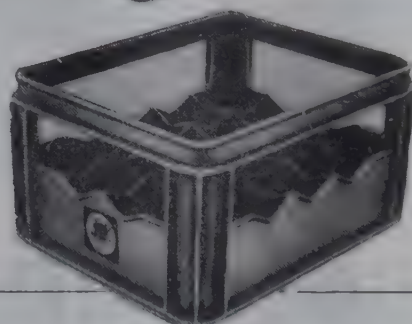
NESTING

2979

POUCH CRATE

DIMENSIONS IN MM			
	L	B	H
INNER	515	205	174
OUTER	560	295	180

For 20 bottles
upto 500 ml. Capacity
upto 215 mm height
upto 80 mm diameter



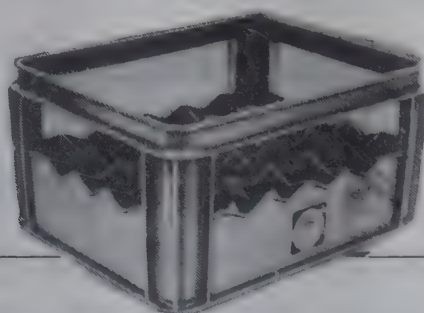
STACKABLE

2920

20 BOTTLE CRATE

DIMENSIONS IN MM			
	L	B	H
INNER	424	334	232
OUTER	452	363	246

For 30 bottles
upto 350 ml. capacity
upto 215 mm height
upto 65 mm diameter



ON CONVEYOR BELT

2930

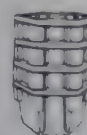
30 BOTTLE CRATE

DIMENSIONS IN MM			
	L	B	H
INNER	430	339	232
OUTER	462	371	246

For 18 pyramid
packs of 500 ml. each



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GRAM 'HOUSEWARE' TELEX 11-6332 PEXO IN

24358, Gram: Beardsell, Tlx: 041-6848;
 New Delhi: 603 Suryakiran Bldg, 19 Kas-
 turba Gandhi Marg, PB No 526, -110001;
 Ph: 3310909, 3310998, Gram: Beardsell,
 Tlx: 031-62996; Secunderabad: Xavier's Inst
 of Mgmt, 7 Rd No 1, Nehru Nagar, Marredpally;
 Ph: 821421. Products: Thermocole, Meto-
 plast packaging systems, Fomathane polyure-
 thene material and Insulation Contractor.



BESTO CLUTCHES & SPARES, 167 Readymoney
 Terrace, 4th Floor, Dr A B Rd, Worli,
 Bombay 400018; Ph: 4930503, 4934630,
 Gram: Cluchbrush; Mg Partner: Harminder
 Singh Patheja, Ph (resi): 536793. Branch:
 448, 1st floor, 7th Cross, 1st Block,
 Jayanagar, Bangalore 560011; Ph: 601524.
Products: Electromagnetic clutches and
 brakes for Prepac machines, Poly Pac and
 Filpac machines. Brand Name: Besto.

**BHADRACHALAM
 PAPERBOARDS
 LIMITED**

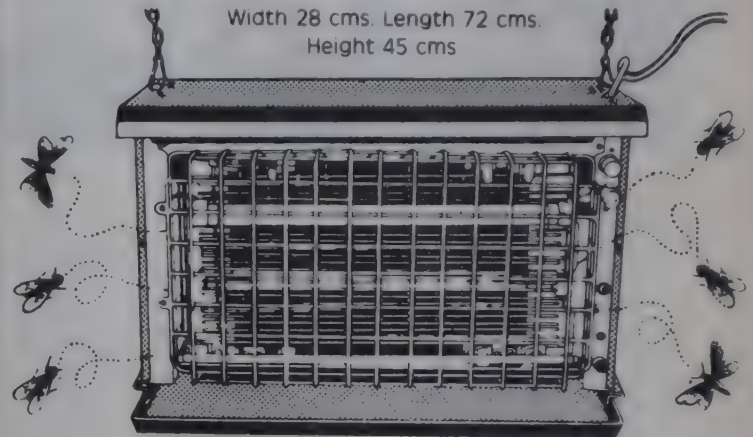
BHADRACHALAM PAPERBOARDS LIMITED, 31 Saro-
 jini Devi Rd, Secunderabad 500003; Ph:
 824366 to 824373, Gram: Paperboard, Tlx:
 0155-6573 BPL IN; Mg Dir: K L Chugh, Ph:
 822164; Vice-Pres (Mktg): M M Shukla;
 Dep Mgr (Mktg): K K S Nambiar. Branch:
 817 Tulsiani Chambers, Nariman Point,
 Bombay 400021; Ph: 220571, 244661, Gram:
 Bhadboard, Tlx: 011-4510 BADA IN; Mgr: R
 Malhan. Products: Paper and Paperboards
 for packaging of dairy products.

BHARAT SYNTHETIK, WZ-298 Madipur, New Delhi
 110063; Ph: 5417671; Prop: Patanjali
 Rajpal. Products: Rubber and plastic
 parts. Brand Name: Bharat.

BOROSIL GLASS WORKS LTD, 44 Khanna Construc-
 tion House, Abdul Gaffarkhan Rd, Worli,
 Bombay 400018; Ph: 4930362, Tlx: 011-3851.
Products: Apparatus tubing, laboratory
 glassware, butyrometer bulbs, flat
 tubing, lighting products.

CAPRIHANS INDIA LIMITED, Block D, Shivsagar
 Estate, Dr A B Rd, Worli, Bombay 400018;
 Ph: 4921900, 4922107, Tlx: 011-73769 CIL
 IN; Mg Dir: Suresh A Gandhi. Branches:
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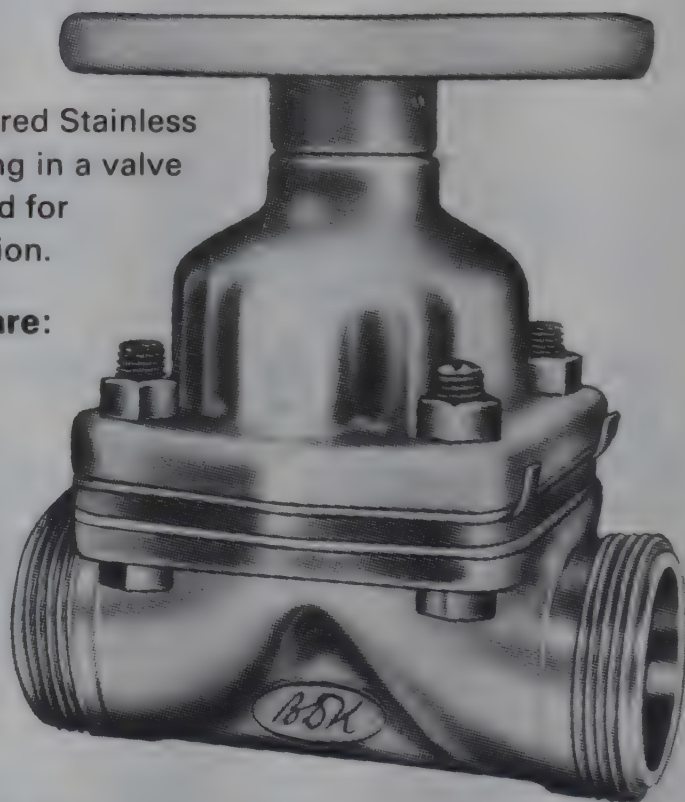
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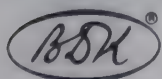
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CHADHA SALES PVT LTD, 137 Rajindra Market, Tis Hazari, Delhi 110054; Ph: 2511416, 2518477, Tlx: 31-63194 CHDA IN; Mg Dir: M P S Chadha, Ph (resi): 7119050. Products: Aluminium cans, brushes, caps, centrifuges, cream separator spares, lock stoppers, sampling appliances, strainers, etc.

CHETANA STEEL INDUSTRIES, 74 GIDC Estate, Vithal Udyog Nagar 388121, Gujarat; Ph: 1024, 7748 (Anand); Partners: M J Patel, J A Patel. Products: Valves and pipe fittings. Brand Name: Chetana.

CHOKSI TUBE CO LTD, 113 Bajaj Bhavan, Nariman Point, Bombay 400021; Ph: 2028530, 2021568, Gram: Tubechoksi, Tlx: 011-3947; Asst Sales Mgr: Bhanu Joshi. Regd Off & Factory: Plot No 60/A, Vatva Indl Area, Ahmedabad 382445. Product: SS tubes. Brand Name: Choksi.

COLOUR CARTONS LIMITED, Tiecicon House, Dr E Moses Rd, Bombay 400011; Ph: 4923151, Tlx: 11-73710; Chief Exec: C T Thadhani. Products: Printed cartons, wrappers.

COMMERCIAL PLASTICS, D-17 Industrial Estate, Visakhapatnam.

COMPRESSOR SPARES SPECIALITIES, Kashinath Bldg, 1st Floor, 290 Shaheed Bhagat Singh Rd, Fort, Bombay 400001; Ph: 260204; Mg Partner: Mrs Vimal Jani, Ph (resi): 6141842; Chief Exec: Nikhil Jani. Products: Spares for air, gas and refrigeration compressors, chilling plant, cold storage, freezing plants. Brand Name: Simco.

CONTINENTAL ENTERPRISES, ED-135/1 Tagore Garden, New Delhi 110027; Ph: 537904, 5412353, Gram: Indusaid; Mg Partner: G B S Bir, Ph (resi): 593050, 593841. Products: Dairy plant spares, ss pipe fittings.

CRESCENT SPRINGS, 238 Nandanvan Industrial Estate, PB 415, Thane 400604; Ph: 593072, 594400; Mg Partner: D M Shah. Products: Steel wire/strip springs.

CROWN CORK MANUFACTURES (P) LTD, B-2 Amausi Indl Area, PB No 118, Lucknow 226012; Ph: 48857, 44402, 52236, 51121 (Works), Gram: Crown Cork; Resident Dir: M M Bhasin; Works Mgr: A K Grover; Comml Mgr: Ravi

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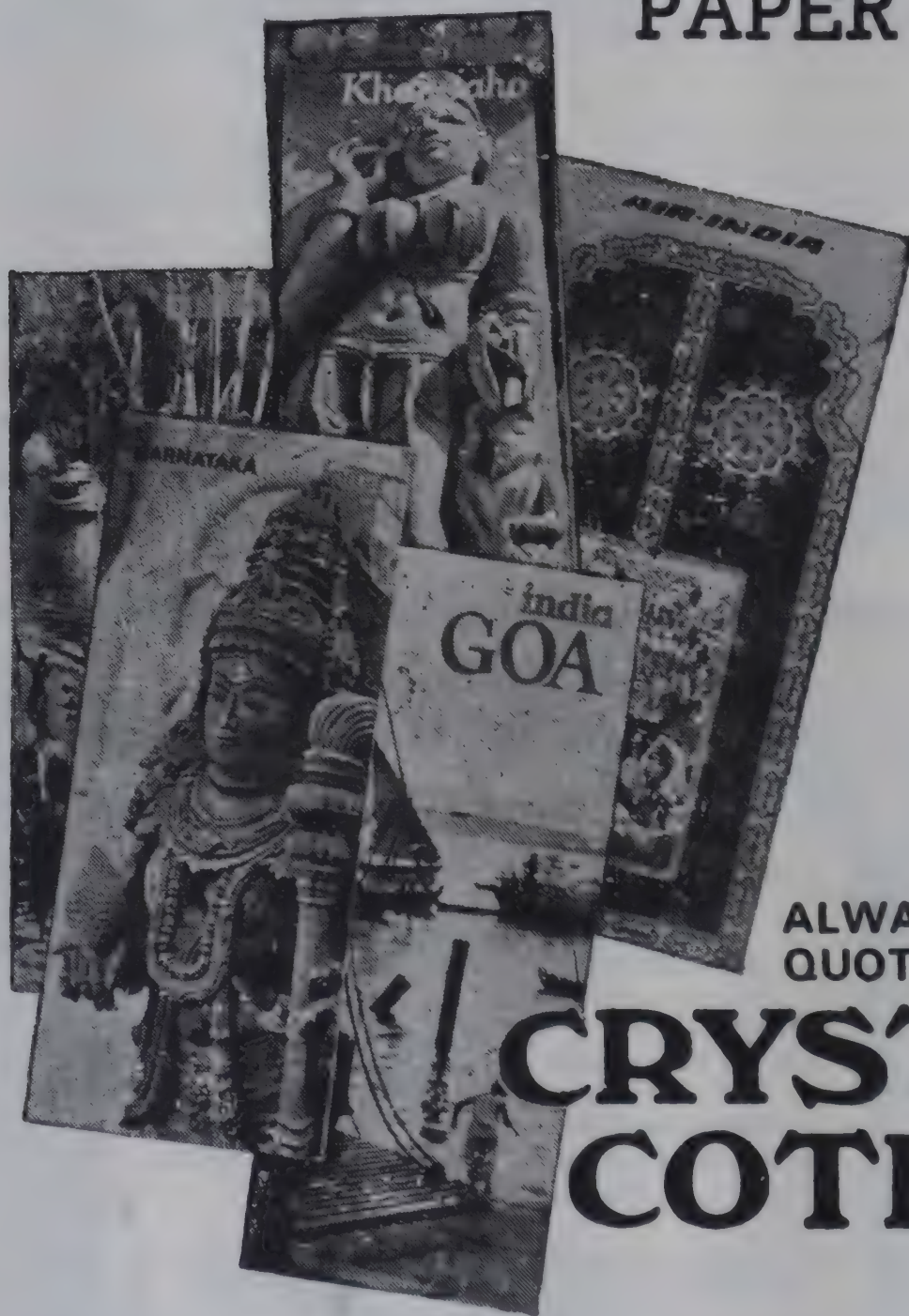


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Mathur. Branch: New Delhi, Ph: 600134, 600138, 60119, 607950, Gram: Frycons; Dirs: Mrs Manju Bhasin, Jaywant Singh, Rakesh Khosla. Products: PVC lined crowns. Brand Name: Crown cork.

D G S COMPANY, 13 GIDC, PB No 16, Vithal Udyognagar 388121, Gujarat; Ph: 3216, 7165, 7463, Gram: Dijisha, Anand; Mg Partner: D G Shah. Products: Dairy machinery spare parts.

DAARS INTRACO PRIVATE LIMITED (DIPL), D-117 Okhla Industrial Estate, Phase I, New Delhi 110020; Ph: 633111, 632058, Gram: Godmidas, Tlx: 31-61415 DIPL IN; Chairman: Maj Gen (Retd) S P Vohra, PVSM, Ph (resi): 672227; Managing Director: Anil K Vohra, Ph (residence): 676443. Foreign Principals (Products): Cryomec AG, Switzerland (Cryogenic Pumps), Planer Biomed, United Kingdom (Freezing Machines), Fortschritt Landmaschinen GDR (Milking Machines), Hamba Machinefabrik, West Germany (Dairy Packaging Equipment), World Wide Sires, United States of America (Frozen Bull Semen), FarmKey Limited, United Kingdom (Frozen Semen Laboratory Equipment), International Embryos Limited, United Kingdom (Diagnostic Kits and Embryo Transfer Technology) and Aussie Tag Private Limited, Australia (Ear Tags).

DAIRY EQUIPMENT COMPANY, 111 Wadala Udyog Bhavan, Wadala, Bombay 400031; Ph: 4129127, 4120201, Gram: Dairyequip; Mg Partners: D M Doshi, R D Doshi, A D Doshi, Ph (resi): 542476. Associate: Doshi & Sons, PB No 14, Anand 388001; Ph: 1384, Gram: Doshisons; Mgr: J M Doshi. Products: Foil caps for bottles. Brand Name: Deco.

DAIRY UDYOG, Ghatkopar Industrial Estate, Block C, Unit No 229A/230A, 2nd Floor, L B S Marg, Ghatkopar, Bombay 400086; Ph: 586878, 584960, 583636, Gram: Dairyudyog; Partners: Ramesh D Zaveri, Satish F Daftary. Products: Dairy appliances, can scrubbers, milk containers.

DAS BROS & CO, 14/1 Canal East Rd, Ulta-danga, Calcutta 700067. Products: Wooden sticks, spoons for ice cream, lollies.

DAYRY ENGINEERING SERVICES PVT LTD, 14 N P Developed Plots, Ekkattuthangal, Madras 600097; Ph: 431639; Mg Dir: M R Prasad, Ph (resi): 423165. Products: SS valves and pipe fittings.

DECO GLASS INDUSTRY, Subhash Rd, Near Laxmi Cinema, Anand 388001; Ph: 1384 PP; Partner: C J Shah. Products: Milk Butyrometer and other glassware.

DEEP CHEM COMPLEX, Poddar Bhawan, Dahi Wali Gali, Bharatpur 321001, Rajasthan; Ph: 2757; Partners: Hari Shankar, Kailash Nath; Sales Mgr: A K Singhal. Products: Adhesive labels.

DHIRAJ TRADERS & MANUFACTURERS, 43/45 Kika St, PB No 3595, Bombay 400004; Ph: 8516768, 8514192, Gram: Soundmetal; Mg Partner: N C Shah. Branch: Delhi, Ph: 697721; Mgr: Deepak Shah. Products: SS pipe fittings, valves.

DILIP C BHATE, 'Jamuna' Govt Colony, Vishrambag, PB No 90, Sangli 416415; Ph: 5162; Prop: Dilip C Bhate. Sales & Service: Govt Dairy Rd, Miraj 416410; Ph: 2195; Mgr: N V Khimani. Products: MS Milk cans, Wholesale dealers in all dairy equipment. Brand Name: DCB.

DURGA TRADERS, Durga Estate, NH No 8, Chhani Rd, Baroda 390007; Ph: 21202-3-4, Gram: Durgachem; Mg Partner: Rasiklal C Shah, Ph (resi): 82250. Branches: Ahmedabad: 11 Embassy Market, Ashram Rd, -380009; Ph: 448947; Ankleshwar: 19 Bhavna Farm, Rajpiplea Rd; Ph: 2571. Products: Laboratory equipment.

EAGLE FLASK PVT LTD, Talegaon 410507, Dist Pune; Ph: 321 to 325 (Talegaon via Pune), Gram: Eagleflask, Pune, Tlx: 0145-296; Mktg Mgr: B Manchanda. Exec Off: 141 Sheriff Devji St, Bombay 400003; Ph: 322096, Gram: Eagleflask, Tlx: 011-3297; Mg Dirs: A C Padamsee, Mrs D I Padamsee; Delhi Off: 813 New Delhi House, Barakhamba Rd, -110001; Ph: 3315066; Asst Regl Mgr: Piyarelal. Product: Vet flask for semen transportation (Vet 49). Brand Name: Eagle.

EAGLE LITHOGRAPHING CO (P) LTD, 26-B Christopher Rd, Calcutta 700046; Ph: 295253. Product: Flexible packaging.

EASTERN STORES & TRADING CO PVT LTD, 115A Nagdevi St, Bombay 400003; Ph: 322215, 328585, Tlx: 011-4647. Product: Teflon hoses. Brand Name: Markwel.

ECOPLAST PVT LTD, Sona Udyog, Building No 4, Parsi Panchayat Rd, Andheri (E), Bombay 400069; Ph off: 6325364, 6325837; Dir: P P Kharas, Ph (resi): 381810. Product: Co-extruded film.

ENGINEERING HINDUSTAN, 404 Ready Money Terrace, Dr A B Rd, Worli Naka, Bombay 400018; Ph: 4934630, 4930503, Gram:

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Clutchbrush; Mg Partner: H D S Patheja, Ph (resi): 6429197; Sales Mgr: M L Malik. Branch: 448, 7th Cross, 1st Block, Jayanagar, Bangalore 560011; Ph: 601524, Gram: Clutchbrush; Mgr: K S Shivsubramanya. Other Offices: Calcutta, Delhi. Products: Electromagnetic clutches, Clutch plates and Telescopic Brushes. Brand Name: Engineering Hindustan.

ENTERPRISE TRADING CO, 429 Rajguru's Pole, Gandhi Gate Rd, Vadodara 390017; Ph: 552366, Gram: Entraco; Mg Partner: H C Chhatrivala; Mgr: C H Chhatrivala. Products: Synthetic fibre filter bags and pads for milk pasteurization plants.

ESSEL PACKAGING LIMITED, 135 Dr A B Rd, Worli, Bombay 400018; Ph: 4933280, 4934405, Gram: Lamiboard, Tlx: 76909 ESEL IN; Gen Mgr (Mktg): R P Santwan; Mktg Mgr: A B Mangaokar. Branch: B-10 Lawrence Rd, Indl Area, New Delhi; Ph: 7115607/8. Products: Tubes and laminates for cheese and lidding materials for plastic containers. Brand Name: Esolapack.

EXOPLAST PACKAGES PVT LTD, 401 Kakad Chambers, 132 Dr A B Rd, Worli, Bombay 400018; Ph: 4931310, 4935602, 4934473, Gram: Granplast, Tlx: 011-75321 EXKI IN; Mg Dir: G C Motwani; Sr Sales Offr: P R Vinod Kumar; Asst Mgr (Dev): G R Itraj. Products: Co-extruded plastic films, heavy duty LDPE valve type bags and liners. Brand Name: Exoplast.

FAIRMARKS PVT LTD, ED/312 Old Railway Rd, Jalandhar 144008; Ph: 72904; Mg Dir: S K Mohindru; Dir: Mrs S Mohindru. Products: Boiler chain gears, industrial brake roll lining, clutch facings.

FINNPACK (INDIA) LTD, 78/3 Janpath, New Delhi 110001; Ph: 325038, Gram: Polyfilm, Tlx: 031-4865 HMF IN; Dir: Berjesh K Goyal, Ph (resi): 672382. Factory: 30th Km G T Karnal Rd, Jaanti Rd, Kundli, Dist Sonapat; Ph: 7472246. Product: Multilayer co-extruded film for packing long life milk.

FLEX LAMINATORS PVT LTD, M-107 Greater Kailash-II, New Delhi 110048; Ph: 6449552, 6449553; Mg Dir: A K Chaturvedi. Product: Multilayer co-extruded films.

FLEXAIRE, 12 Ho Chi Minh Sarani, Calcutta 700071; Ph: 447676, 449914, Gram: Flaire, Tlx: 021-7459; Gen Mgr: Udayan Ray. Product: Co-extruded multilayer film.

FOREMOST CONTAINERS LIMITED, 72 Janpath, New Delhi 110001; Ph: 352321, 352578, 352625, 352694, Gram: Skimmilk, Tlx: 031-2969 SKIM IN. Product: Metal cans.

GARWARE PLASTICS & POLYESTER LTD, 50-A Swami Nityanand Marg, Western Express Highway, Vile Parle (E), PB No 6853, Bombay 400057; Ph: 6346381; Mg Dir: S B Garware. Product: Laminated foils.

GOEL PACKAGING PVT LTD, 19 Pollock St, Calcutta 700001; Ph: 268793, 267573. Product: Co-extruded plastic film.

GOODWELL INDUSTRIES, New Colony, Opp Railway Goods Shed, Faridabad; Ph: 8123698, Gram: Gowell; Mg Partner: Amarjeet Lamba. Products: Ball valve, can valve, CIP tank, dump tank, flush bottom valve and bend, high pressure valves, tilting type ghee pan. Brand Name: Goodwell.

GUARDIAN PLASTICOTE LTD, 12 Ho Chi Minh Sarani, Calcutta 700071; Ph: 447676, 449914, Gram: Extulam, Tlx: 7459; Exec Dir: Ranjit Sen; Corporate Mgr: A Khalil. Products: Flexible laminates.



GYAN PACKAGING INDUSTRIES PRIVATE LIMITED, 4, Balmiki Marg, Lucknow; Ph: 31576, 35618, Gram: Gyan Bharti; Mg Dir: Rajiv Sharma; Chief Exec: Sanjay Upreti, Ph (resi): 71083. Regd Off: D-31, Sector H, Aliganj Ext, Lucknow; Ph: 71324. Product: Co-extruded multilayer films.

HALDYN GLASS WORKS PVT LTD, Off Western Express Highway, Goregaon (E), Bombay 400063; Ph: 696311-4, Tlx: 011-71570. Products: Glass bottles, jars, vials.

HINDUSTAN NATIONAL GLASS & INDUSTRIES LTD, 2 Red Cross Place, PB No 2722, Calcutta 700001; Ph: 230101, Gram: Glassage, Tlx: 021-2850 SOMA IN; Mg Dir: C K Somany; Mgr (Engg Service): M M Bhattacharjee; Mgr (Ceramic Service): B Ray; Chief Works Exec: R K Nahata. Branch: 312 Neelam, Sea Face Rd, Worli, Bombay 400018. Products: Glass bottles and pressed tumblers.

HINDUSTAN PACKAGING COMPANY LIMITED (Jt Venture of Indian Dairy Corporation and Tetra Pak), Paper Laminating Plant, Near Itola Railway Station, Vadodara 391240, Gujarat; Ph: 22 (POR), Gram: Hindpac, Vadodara, Tlx: 0175-267 HDPC IN & 0175-239 IDC IN (PP); Chmn, Mgmt Committee: Dr P P Aneja, Ph off: 66432; Factory Mgr: S L Taneja. Regd Off: NDDB Campus, Anand 388001; Ph: 3002 to 3011, Tlx: 0172-207 NDDB IN. Products and Service: Laminated paper for aseptic packaging.

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I T C LIMITED, Packaging & Printing Div, 90 Chamiers Rd, Madras 600018; Ph: 450794, Gram: Powhattan, Tlx: 041-417; Divl Mgr: K Chadha; Divl Mktg Mgr: Deepak Sahay, Ph off: 450794, resi: 451979. Branch Sales Off — Bangalore: Sri Lakshmi Complex, 54 St Marks Rd, -560001; Ph: 561143, Tlx: 845-295; G Ramanand; Bombay: Royal Insurance Bldg, Jamshedji Tata Rd, -400020; Ph: 221189, Tlx: 11-3470; K R Chary; Calcutta: Virginia House, 37 Chowringhee, -700071; Ph: 246513, Tlx: 21-7642; A K Uppal; Madras: PB No 2277, Tiruvottiyur, -600019; Ph: 555121, Tlx: 041-7191; C S Das; Madurai: 5E Vinayaka Nagar, -625002; Ph: 41249; New Delhi: Thapar House, 124 Janpath, -110001; Ph: 312727, Tlx: 31-66089; Girish Bhargava; Secunderabad: 66 Rastrapathi Rd, -500003; Ph: 77065, Tlx: 0425-6972; S Rai. Products: Packaging materials including butter cartons, cheese cartons, chocolate cartons and wrappers, skimmed milk powder cartons, lined cartons for malted beverages, Cundell systems machinery for granulated products packaging.

IMPERIAL TUBE & HARDWARE MART, 132 Nagdevi St, Bombay 400003; Ph: 323769, 348420, Gram: Imptube, Tlx: 011-5877; Partners: D M Dharia, M C Dharia. Products: Stainless steel valves, fittings. Brand Name: IT.

INDIA FOILS LIMITED, 4 Mangoe Lane, Calcutta 700001; Ph: 289431, 282842, Tlx: 021-7035, 021-7904; Pres: A Ray; Mktg Controller: A Soni. Branches — Bangalore: Lavelle Heights, Lavelle Rd, -560001; Ph: 570346, 561948, Tlx: 0845-608; Bombay: Bank of Baroda Bldg, 12 Bombay Samachar Marg, -400023; Ph: 2044980, 2045403, Tlx: 011-2836; New Delhi: Himalaya House, 23 Kasturba Gandhi Marg, -110001; Ph: 3315273, 3310218, Tlx: 031-3134. Product: Aluminium foil.

INDIA TAG INDUSTRIES, 5185/4 Krishan Nagar, Karol Bagh, New Delhi 110005; Ph: 585543;

Partners: V K Dutt, Deepak Bhatia. Products: Ear tags, surgical and vet eqpt.

INDIAN ALUMINIUM CO LIMITED, Air India Bldg, Nariman Point, Bombay 400021; Ph: 2023537, Gram: Indalumin, Tlx: 011-2530 INDL IN; Divl Mgr: S M Shahi; Sales Mgr: A K Caprihan. Product: Aluminium foil. Brand Name: Indal.

INDIAN DAIRY MACHINERY COMPANY (A unit of Indian Dairy Corporation, Managed by National Dairy Development Board), C-1/11-12 GIDC, Vithal Udyognagar 388121, Gujarat; Ph: 7490, 7831, 7974, Gram: Indmac, Tlx: 0172-206 IDMC IN; Proj Mgr: Mahesh Chandra; Asst Mgr (Fabrication): K Mathiyalagan; Asst Mgr (Erection): Anil Shenoi. Products/Services: AI consumables, valves and fittings.

INDIAN PLASTICS LIMITED, Poisar Bridge, Kandivli, Bombay 400067; Ph: 661241, 661242, Gram: Plastics, Tlx: 011-74438 IPL. Products: Crates.

INDUS PRECISION CASTINGS, 14/4 Mathura Rd, behind Cold Storage, Faridabad 121003; Ph: 82-5529; Mg Partners: N K Khurana, A K Anand. Products: SS castings.

INDUSTRIAL PLASTIC FORMING CO, F-3 Khira Industrial Estate, S V Rd, Santacruz (W), Bombay 400054; Ph: 6120707, 6129124; Partners: Arun Bhargava, Ajay Bhargava. Products: Plastic packages/containers.

INSEMINATION & DAIRY EQUIPMENTS, F-4, DSIDC Industrial Complex, Rohtak Rd, Delhi 110041; Prop: B K Sehgal. Products: AI consumables.

INSTRUMENTS & COMPONENTS, Garia Main Rd, Garia PO 700084, Dist 24 Parganas; Partners: S Sur Roy, A N Chowdhury, Ph (resi): 447322 (Calcutta). Products: Sachet eqpt, SS pipe fittings, valves.

JANDWANI POLY PRODUCTS PVT LTD, SCO 375-76, Sector 35-B, Chandigarh 160036; Ph: 20566, 31127, Gram: Jandwani, Tlx: 395-357 PPCW IN; Mg Dir: Mrs Kiran Mohini Kumar. Factory: PO Mubarakpur, Dist Patiala; Ph: 56, 66 (Derabassi); Mgr: D C Yadav. Product: Polythene film.

JEMCO INDUSTRIES, 66 Smith Gunj, Delhi Gate, Meerut 250002; Mg Partner: Jamil Ahmed; Partner: S Ahmed. Factory: 11 Sabun Godam, Baghpat Rd, Meerut 250002; Ph: 8744. Products: MS Milk Cans, milking pail, ice chambers, plungers. Services: Repair all types of cans.

K M Feil Pvt Ltd, Gresham Assurance House, Sir P M Rd, GPO PB No 532, Bombay 400001; Ph: 250884; Dirs: A A Katib, Ph (resi): 893074; G M Solomon, Mrs R G Solomon,

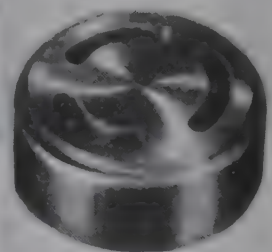
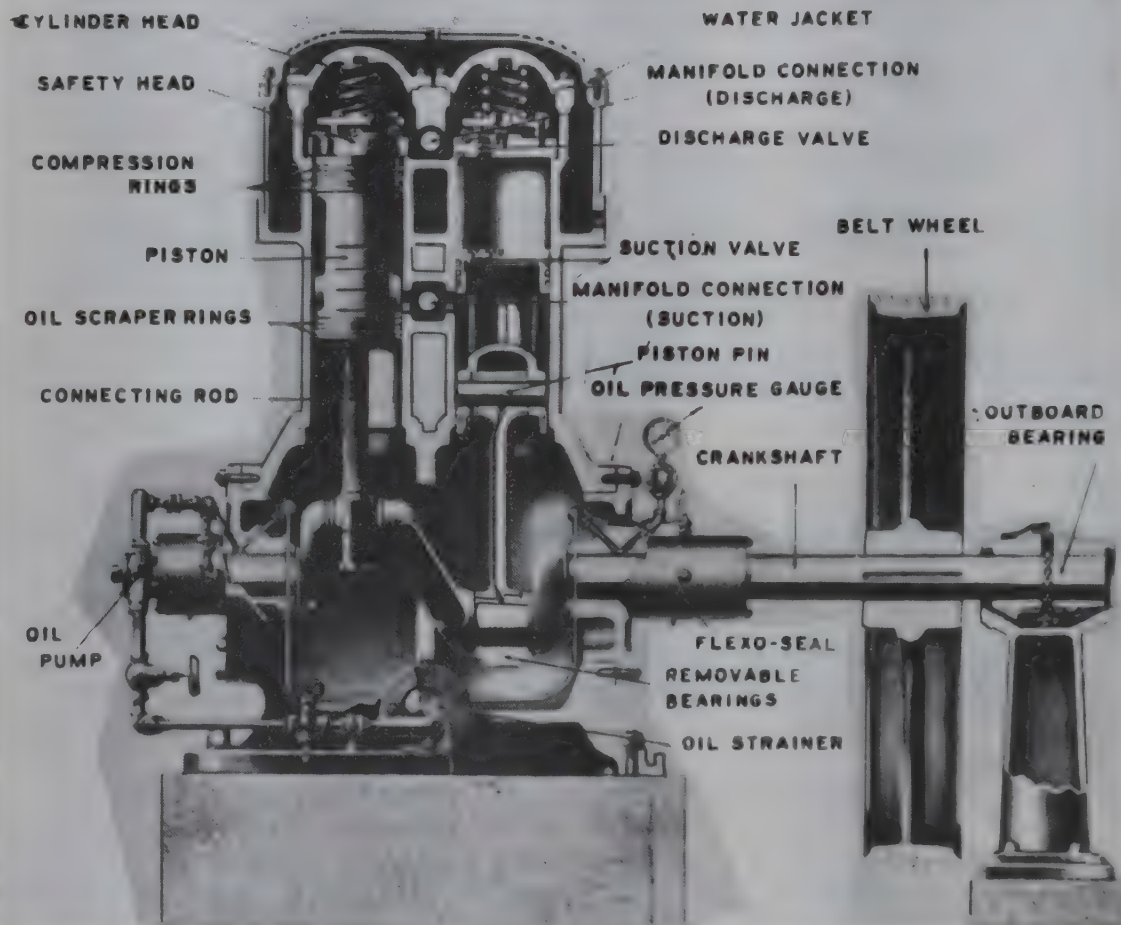
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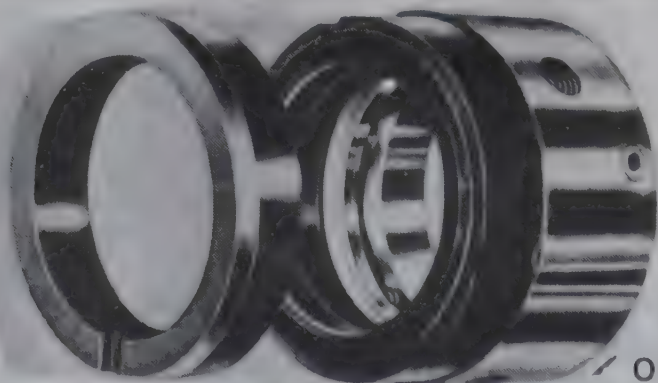
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- Ph (resi): 231771. Product: French pure vegetable parchment paper.
- KAIRA CAN COMPANY LTD, Tiecicon House, Dr E Moses Rd, Bombay 400011; Ph: 4925705, Gram: Milk cans, Tlx: 011-76367 KCAN IN; Chmn: H N Kapadia; Mg Dir: Ajay N Kapadia. Plants — Anand: PB No 23, -388001; Ph: 3484, 3062, Gram: Milk cans, Tlx: 0172-205 KCAN IN; Works Mgr: N Vishwanathan; Himmatnagar: Sabar Dairy Compound, -383001; Ph: 1408; Kanjri: Tal Nadiad (Gujarat); Ph: 38, 64; Mehsana: Dudhsagar Dairy Compound, -384002; Ph: 20980, 21241. Products: OTS and general line tin containers.
- KAKTIN M INC, J-11/116, Rajouri Garden, New Delhi 110027; Prop: Ravinder Singh; Mgr: Harvinder Matharu. Products: SS valves and fittings.
- KAY BEE ELECTRONICS, 10/65 Kirti Nagar Indl Area, New Delhi 110015. Product: Plastic novelties.
- KAY PACKAGINGS PRIVATE LIMITED, Admn Off: 102-B Hind Saurashtra Industrial Estate, Andheri Kurla Rd, Marol Naka, Bombay 400059; Ph: 6329664, 6349219, 6349225 & 6301760, Gram: Kaypack, Tlx: 011-72272 SK IN; Chmn & Mg Dir: Suresh Sharma, Ph off: 240962, resi: 8228946, 8124336; Chief Exec: Prakhyat Sharma; Market Coordinator: Kunal Sharma. Regional Off: C-21 Shakti Nagar Extn, New Delhi; Ph: 741046, Tlx: 31-63443 SK IN; Regl Mgr: R P Kapoor. Factories — (i) Plot No 1806, Phase III, GIDC, Vapi 396195, Gujarat; Ph: 1546, 1057, Tlx: 0173-276 KAY IN; (ii) Plot A-28/1 MIDC, Patalganga, Dist Raigad, Maharashtra; Ph: 231, 296 & 297. Product: Co-extruded multilayer plastic films of different polymer combinations. Brand Name: SK.
- KHEMKA PLASTIC UDYOG (PVT) LTD, 1 & 2 Hare St, Calcutta 700001; Ph: 220477. Product: Co-extruded plastic film.
- KISHOR TRADING CORPORATION, PB No 9202, Nao-roji Lane, Makanji Niwas, Ghatkopar, Bombay 400086; Gram: Dairyfoils, Bombay 400015; Prop: Kishor M Doshi, Ph (resi): 5135894. Sales Off & Works: 203 Bussa Udyog Bhavan, Tokershi Jivraj Rd, Sewri, Bombay 400015; Ph: 4131617. Products: Aluminium caps and foil rolls. Brand Name: KTC.
- KLAS ENGINEERING PVT LTD, 31, 1st Block East, Jayanagar, Bangalore 560011; Ph: 604693; Dir: K L V Subbiah. Products: OTS cans/containers.
- KOHLI INDUSTRIES, 29 Sona Udyog Indl Estate, Parsi Panchayat Rd, Andheri (E), Bombay 400069; Ph: 6324267; Chief Exec: S S Kohli. Products: Paper bags, plastic pouches.
- KPSAR ENGINEERING WORKS, J-10/46 Rajouri Garden, New Delhi 110027; Ph: 594092; Mg Partner: Harnam Singh; Partner: K P Singh; Mgr: Ravinder K Arora. Works: (i) 5/217 Subhash Nagar, New Delhi 110027; Ph: 5417935; (ii) GI-102 Mayapuri Indl Area, Phase II, New Delhi 110027; Products: Dairy eqpt, ss valves and fittings. Brand Name: Kpsar.
- KRISHNA SILICATE & GLASS WORKS LTD, 17 Radha Bazar St, Calcutta 700001; Ph: 277191, Gram: Krishnaglas; Chief Exec Offr: R C Joshi. Product: Bottles.
- KUMAR TRADING AGENCY, 96 Narayan Dhuru St, Bombay 400003; Ph: 343699; Prop: K S Mehta, Ph (resi): 6724089. Products: Rubber and carbon parts, channels, gaskets, rings, washers and teflon products and dunlop V belt and hoses.
- LUTHRA PAPER CUPS, 15/5889 Mohalla Sikligran, Nabi Karim, New Delhi; Ph: 516547. Products: Ice cream paper cups.
- M M TRADERS, 30/3 Double Storey, Ashok Nagar PO, Tilak Nagar, New Delhi 110018; Ph: 5413949; Proprietor: S C Malik. Products: Dairy, Lab equipments and glasswares. Brand Name: Milkman.
- M P VALVES MFG CO, 70 Nagdevi St, Bombay 400003; Ph: 324415; Prop: Mahesh P Shah, Ph (resi): 388473; Mgrs: Mahasukh P Shah, Kiran N Kadkia. Products: SS valves and fittings. Brand Name: MP.
- MAHALAKSHMI GLASS WORKS PVT LTD, Dr E Moses Rd, Bombay 400011; Ph: 4920313, 4920314, Gram: Raceview, Tlx: 011-3085; Dirs: Mahesh Chand, Dr Naresh Chand, Ramesh Chand; Chief Exec: B K Ramchandani. Branch: Sanatnagar, Hyderabad 500018; Ph: 261732; Mgr: N K Gupta. Product: Bottles.
- MAHARAJA PLASTIC PRODUCTS (INDIA), 5/2 Grants Bldg, Arthur Bunder Rd, Colaba, Bombay 400005; Ph: 245016, 245117, Gram: Kolorkalp; Dir (Mktg): Manoj Parikh. Products: Plastic cups for packaging of dairy products.
- MAHAVIR METAL WORKS, 493-94 Bartan Market, Sadar Bazar, Delhi 110006; Ph: 514644, 525417; Mg Dir: M R Jain. Products: Aluminium utensils. Brand Name: Prince, Nagina, Rani.
- MERIGOLD CANS LIMITED, 78/4 Janpath, New Delhi 110001; Ph: 310827, 324990, Gram: Madhufood, Tlx: 031-4865 HMF IN; Dir: A K Agarwal. Regd Off & Works: 31st Km

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MILK CONTAINERS INDUSTRY, C-229-A Ghatkopar Industrial Estate, L B S Marg, Ghatkopar (West), Bombay 400086; Ph: 584960, 583636, Gram: Containers; Mg Partner: Satish F Daftary. Product: Alu Alloy Containers.

MITTAL BROTHERS, 3661 Chawri Bazar, Delhi 110006; Ph: 262843, 262696, 266871, 271202, Gram: Steel; Partner: L C Jain. Factory: 94 Okhla Indl Estate, New Delhi 110020; Ph: 633081. Branches: Bombay, Calcutta. Products: Stainless steel eqpt and utensils. Brand Name: MB.

MODY BROTHERS & CO, 52 Nagdevi Cross Lane, Bombay 400003; Ph: 324758, Gram: Modibrosco. Products: Fittings, valves and accessories.

MOHAN INDUSTRY, C-8 Focal Point, Rajpura 140401, Punjab; Ph: 2261, 2421, Gram: Khandelia; Mg Partner: Jagmohan Lal Khandelia. Branches: Chandigarh, Delhi. Product: Tin containers.

MULTIFILMS PLASTICS PVT LTD, 65 Nariman Bhan, Nariman Pt, Bombay 400021; Ph: 2025809, Tlx: 5337; Mg Dir: Sudhir Bardiwadekar, Ph(resi): 6144005. Products: Plastic films.

MULTILAYER COMPOSITES PVT LTD, 5 Fancy Lane, 3rd floor, Calcutta 700001; Ph: 287040, 287527, Gram: Multifilm, Tlx: 021-7072; Mg Dir: R K Dutta; Mktg Mgr: P Sen Roy. Factory: NH 5, Ganeswarpur Indl Complex, PO Janugang, Balasore 756009, Orissa; Ph: 2643, 2791. Product: Co-extruded multilayer films.

MULTISAK CORPORATION, 13-14 Asaf Ali Rd, New Delhi 110002; Ph: 273843-44, Tlx: care 31-2782 PPL IN; Chief Exec: B Sarup, Ph (resi): 626209. Product: Multiwall paper bags.

MUTUAL PLASTICS, Nilam Mansion, 2nd Floor, Tribhuvan Rd, Bombay 400004; Partner: P R Pancholi. Factory: 98/99 Selvas Rd, GIDC, Vapi. Product: Bottle crates, milk pouch crates, plastic milk can, plastic lids for aluminium milk cans.

MUTUAL STEEL INDUSTRIES, 47 Govt Industrial Estate, Kandivli (W), Bombay 400067; Ph: 696241-42-43, Tlx: 011-3241; Partners: D K Gandhi, Y K Gandhi, Ph (resi): 5120714. Product: Plastic crates.

N T V MULTIWALL PAPER BAG CO PVT LTD, 101 Arcadia, 10th Floor, Nariman Point, Bombay 400021; Ph: 223608, 225215, Gram: Antivora, Tlx: 5314; Mg Dir: D N Vora; Dir: R N Vora; Sales Mgr: C J Dave.

Products: Multiwall paper sacks, Hessian laminated bags.

NATIONAL PRODUCTS, No 1, Krishnappa Maistry St, Park Town, Madras 600003; Ph: 30774, Gram: Nationtoy, Tlx: 041-6946 ENPI IN; Mg Partner: Sudershan Parakh, Ph (resi): 39639. Factory: A3/A4 Industrial Estate, Guindy, Madras 600032; Ph: 431036. Products: Plastic crates/tubs for milk sachets. Brand Name: National.

NAVEEN SCIENTIFIC INDUSTRIES, Lactowin House, Near B D High School, Ambala Cantt; Ph: 22592, 22398, Gram: Lactowin; Prop: Amrit Lal Aggarwal, Ph (resi): 20698; Sales Exec: Manjeev Aggarwal. Products: Milk-ghee-powder testing eqpt, lock stopper, lactometer, centrifuges, milk cans, Butyrometers, pipe fittings, tilt measure, etc.

NILESH ENTERPRISE, Admn Off: 65 Kazi Sayed St, 4th Floor, PB No 3146, Bombay 400003; Ph: 348401, 323619, Tlx: 011-73820 JRBC IN. Products: Bearings and belts.

NILKAMAL PLASTIC & ALLIED INDUSTRIES, 5 Rewa Chambers, New Marine Lines, Bombay 400020; Ph: 255746, 255779, Gram: Crates, Tlx: 011-5880; Partners: Sharad V Parekh, Vaman Parekh. Factory: Off Saki Virar Rd, Opp John Baker, Powai, Bombay 400072; Ph: 6323131, 6323132. Product: Plastic crates.

NIRMAL TRADERS, 204/10 National Insurance Bldg, Dr D N Rd, Fort, Bombay 400001; Ph: 4129127, 4120201; Mg Partner: A D Doshi, Ph off: 4129127, 4120201, resi: 542476. Products: Authorised dealers for Vulcan-Laval dairy eqpt.

OMEGA PACKAGING PVT LTD, 11 Sardar Patel Stadium Complex, Bechar Rd, Valsad 396001, Gujarat; Ph: 3813, 3541; Dir: D R Arora. Product: OTS cans and tinplate cans.

ORIENTAL CONTAINERS LIMITED, 1076 Dr E Moses Rd, Worli, Bombay 400018; Ph: 4925581/82, Tlx: 11-73848; Dir: Susheel Somani. Products: OTS containers, tinplate cans.

OVERSEAS PACKAGING INDUSTRIES PVT LTD, 49 Bajaj Bhavan, Nariman Point, Bombay 400021; Ph: 2027041, 2022612; Mg Dir: Uma Shanker Modi. Product: Multiwall paper sacks.

PACK-O-WELL, 48/52 Bazargate St, Parshwa-kutir Coop Housing Society Ltd, Ground Floor, Fort, Bombay 400001; Ph: 263510, 261721; Chief Exec: Pankaj Mehta. Product: Corrugated boxes.

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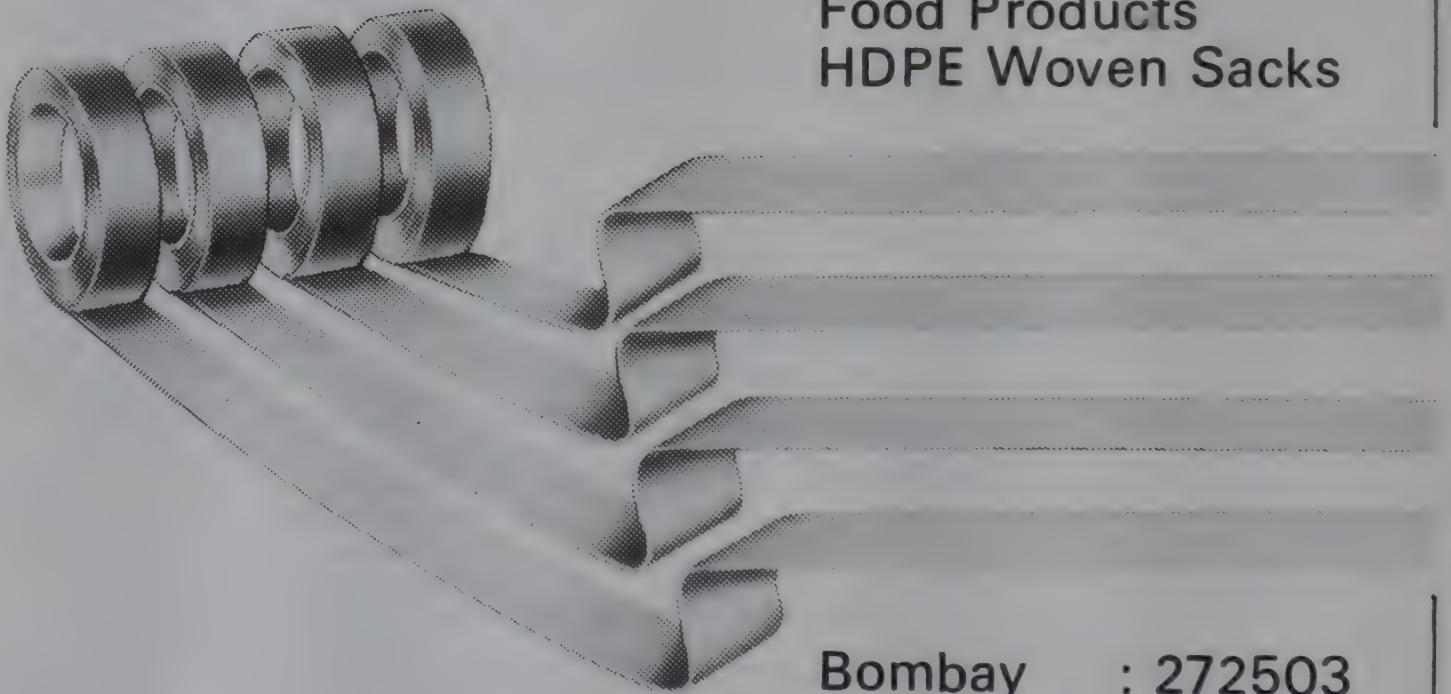
- Arum R Amin. Products: Soft packaging materials, plastic film processors and flexographic printers.
- PADMA PACKAGES LIMITED, Flat No 1, Yashwant Place, Chanakyapuri, New Delhi 110021; Ph: 675867, 676196, Gram: Sincerity, Tlx: 458-228 PDMA IN, 31-3633 PDMA IN.
- PAPER & CARD WARES, 25 Kamla Market, New Delhi 110001; Ph: 274835, Gram: Paca-ware; Prop: Harnam Das; Mgr: Om Prakash. Factory: E/9 Industrial Area, Bahadurgarh, Rohtak; Ph: 83374. Product: Butter packing paper.
- PARAS DAIRY APPLIANCES, 52-54 Mint Rd, Bombay 400001; Ph: 260013, 268917, Gram: Emmisary; Partners: Vijay P Shah, Chhotalal R Shah. Product: All types of dairy eqpt. Brand Name: Paras.
- PERFECT ENGINEERING WORKS, 2162/T-10 Palco House, Shadikhampur, New Delhi 110008; Ph: 568730; Mg Ptnr: T N Khattar, Ravi Khattar; Sales Exec: Ravi Khurana. Products: SS pipe-fittings, conveyors.
- PERFORMANCE PLASCTICS PVT LTD, X-6 Hauz Khas, 2nd Floor, New Delhi 110016; Ph: 664097; Dirs: R Singh, K K Dhar, S Roy. Product: Plastic film.
- PICK N PACK INDUSTRIES, Shekh's Pada, Relief Rd, Ahmedabad 380001; Ph: 339556, 887429; Partner: Deepak Dalal, D S Shah. Product: Corrugated boxes.
- PILOT PRODUCTS, 331 R R Roy Marg, Charni Rd, Bombay 400004; Ph off: 361212, 363435, 361673, factory: 4922666, 4922226, 4929931, 4928170, Gram: Pilot-trade; Mg Dir: Dinesh M Bhayani, Ph (resi): 8120525. Product: Multipurpose steel wool. Brand Name: Supreme.
- PLAST KRAFT INDUSTRIES, 36 Dakshineswar Bldg, 10 Hailey Rd, New Delhi 110001; Ph: 385760, 387061; Partner: Rajinder Sehgal, Ph (resi): 617860. Factory: E-44/6 Okhla Indl Area, Phase II, New Delhi 110020; Ph: 633448. Product: Plastic cups.
- POLYCHEM LIMITED, 7 Jamshedji Tata Rd, Churchgate Reclamation, Bombay 400020; Ph: 220048, 220062, 220166, 220162, Gram: Polychemic, Tlx: 011-2203; Exec Dir: Tanil R Kilachand, Ph (resi): 8123411; Mgr, Plastic Tech Service: P V Dattar. Factory: 45-A, S V Rd, Goregaon (West), Bombay 400062; Ph: 6724393, 6722397; Works Mgr: S K Sanghvi, Ph (resi): 549588. Product: Polystyrene. Brand Name: Polystron.
- POLY POUCH INDUSTRIES, 249 Teppam East, Virudhunagar 626001; Ph: 3852, 3712, Gram: Labam; Mg Partner: P B Krishnan; Partner: P K Moorthy, Ph: 4759. Regd Off: Sharda Chambers, 31 K N Rd, Bombay 400009. Factory: C-8 PIPDIC Indl Estate, Kirumambakkam, Pondicherry 607402. Product: Co-extruded polythene film.
- POYSHA INDUSTRIAL COMPANY LIMITED, PO Box 6281, Tiecicon House, Dr E Moses Rd, Bombay 400011; Ph: 4925705, Gram: Sancans, Tlx: 011-73730 CANS IN; Mg Dir: H N Kapadia; Jt Mg Dirs: T S Bhat, A J Mehta. Branches — Calcutta: 113 Jodhpur Park, -700068; Ph: 424814, Tlx: 021-2517 CANS IN; Edapally: XLI/1413 Ponekara, -682024; Ph: 856047, Gram: Sancans, Tlx: 0885-356 CANS IN; Mgr, Cochin: H R Bhat; Madras: Dhun Bldg, 827 Anna Salai, -600002; Ph: 89711, Tlx: 041-6358 CANS IN; Commercial Mgr: R Harinarayanan; New Delhi: Nehru House, 4B Bahadurshah Zafar Marg, -110002; Ph: 3316619-21, Gram: Sancans, Tlx: 031-65793 CANS IN; Mgr: N Taneja. Factories — Calcutta: Anil Nagar Indl Complex, Budge Budge Trunk Rd, Mahestolla, 24 Parganas; Plant Mgr: B K D Choudhury; Chinglepet Dist: B-9 MMDA Indl Area, Maraimalai Nagar, G S T Rd, -603209; Ph: 34; Plant Mgr: G S Bhat; Edapally: XLI/1413 Ponekara, -682024, Kerala; Ghaziabad: A/14-15 Meerut Rd, Ghaziabad Indl Area; Plant Mgr: V J Prakash; Thane: 8 Kalwa Indl Area, Belapur Rd, PB No 92, -400601; Ph: 922-2371, Gram: Sancans, Tlx: 011-77010; Plant Mgr: D K Dutta Gupta. Products: OTS and General Line Tin containers.
- PRESIDENT EQUIPMENT INDUSTRIES, Amul Dairy Rd, Anand 388001; Ph: 375 PP; Partners: Tushar B Pandya, Vipul A Vora. Products: Butyrometer, Jerry cans, lock-stoppers.
- PRIME PLAST PVT LTD, 114 MIDC, Satpur Area, Nashik 422007; Ph: 30954, Gram: Primeplast; Mg Dir: S W Bodke, Ph (resi): 76759. Product: Co-extruded plastic films. Brand Name: Prime plast.
- RAINBOW PLASTIC INDUSTRIES, 44/45A Giriraj Indl Estate, Mahakali Caves Rd, Andheri (East), Bombay 400093; Ph: 6329249, 6326267; Partner: M D Savla. Products: Polyethelene film, PVC compound. Brand Name: Rainbow.
- RAJASTHAN CYLINDERS & CONTAINERS LTD, SP 825, Rd No 14, Vishwakarma Indl Area, Jaipur 302013; Ph: 832410/420, Gram: Rajcyl; Dir: Girdhar Bajoria, Ph (resi): 41366; Chief Exec: K G Bajoria. Product: Aluminium milk cans. Brand Name: Rajcyl.

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RAM KUMAR & BROS, Ram Ganj Crossing, PB No 61, Etawah 206001; Ph: 456, Gram: Ramkumar Bros; Partners: R A Mittal, Ravi Mittal. Branch: 29/156 Raja Mandi Bazar, Agra. Products: Aluminium caps, glassware. Brand Name: Rakbro.

REFAIRCO, 58 Thirumalai Pillai Rd, T Nagar, Madras 600017; Ph: 442495, Gram: Refairco; Partner: C Kasiviswanathan. Product: Spares for refrigeration compressors.

ROLSFRI CORES PVT LTD, 36 Brindaban Basak St, Calcutta 700005; Ph: 550148, 550857; Dir: A K Roy. Products: Card board plastic cores, tubes.

ROTOFLEX FILMPACK INDUSTRIES, A/4, 2nd Floor, Calsit Mansion, Dr Atmaram Borkar Rd, Panjim, Goa 403001; Ph: 4021, 2102 (factory); Mg Dir: Madhav M Desai. Products: Polythene printed bags (SMP) and polythene rolls.

RUBBER PRODUCTS PVT LTD, C-44 Wagle Indl Estate, Rd No 28, Thane 400604; Ph: 503377. Product: Rubber hoses.

RUMI PLASTICS, 8-A Indian Metal Forging & Rolling Mills Compound, L B Shastri Marg, Vikroli (W), Bombay 400083; Ph: 583943.

S S R GLASS INDUSTRIES, B-209/1 Naraina Indl Area, Phase I, New Delhi 110028; Ph: 533100, 535773; Prop: Sunil Kapoor, Ph (resi): 531351. Products: Butyrometers, lockstoppers, pipettes and glass eqpt. Brand Names: Rahul, Sunny.

SALEM STEEL PLANT (A unit of Steel Authority of India Ltd), Salem 636013, Tamil Nadu; Ph: 7621, 7628, Gram: Stainless, Tlx: 0450-236; Exec Dir: A A Raju; Mgr (Public Relations): M S Srinivasan; Asst Mgr (Purchase): M Ramdas. Products: Food-grade stainless steel no 304 & 306 for dairy industry process eqpt.

SALUJA UDYOG, C-84 Industrial Area, Bulandshahr Rd, Ghaziabad 201001; Ph: 846226; Chief Exec: Atul Saluja. Product: Bubble film.

SAMARPAN, C1-798 GIDC Indl Estate, Makarpura, Baroda 390010. Product: Co-extruded polythene.

SANGLI DAIRY FARM, Maruti Rd, Sangli 416416; Ph: 5101, Gram: Sangli Dairy; Prop: B G Bhate, Ph (resi): 2101. Products: Dairy

machinery, aluminium foil and glass scrap. Brand Name: SDF.

SARAS POLYPACK PVT LTD, 43-45 Sector V, Industrial Area, Parwanoo, Dist Solan, Himachal Pradesh; Ph: 404, 456. Product: Co-extruded plastic film.

SHAKTI CO-EXTRUSION PVT LTD, 305 Chetak Centre, 12/2 RNT Marg, Indore 452001; Ph: 4098; Mg Dir: Amitabh Agarwal, Ph (resi): 37930; Dirs: Sanjeev Sachdev, Mrs Sangeeta Agarwal. Works: Mhow-Neemuch Rd, Vill Pithampur, Dist Dhar, MP. Products: Co-extruded polythene film for milk, SMP, Ghee, Polythene Liners for SMP.

SHAKTI ENTERPRISES, 305 Chetak Centre, 12/2 RNT Marg, Indore 452001; Ph: 4098; Prop: Amitabh Agarwal, Ph (resi): 37930; Mgr: G M Khan. Works: Vill Pathampur, A B Rd, PO Rasalpura, Teh Mhow; Ph: 26 (Rao). Products: Polythene Bags, liners, tubing, bags for ghee, paneer SMP packing, milk pouch film.

SHAMROCK PLASTICS, Safalya, 14th A Road, Khar, Bombay 400052; Ph: 6121932; Prop: D V Pancholi; Sales Exec: Hersh K Pancholi. Products: Plastic milk cans, milk bottle crates, pouch crates, Nagema crate, tetrapack crate.

SHREE BRUSH CO, 40 Anar Coop Indl Estate, Naroda Rd, Near Vijay Mills, Ahmedabad 380025; Ph: 374050. Product: Industrial brushes.

SOMCHAND BROTHERS, 12 Mangesh Senoy Rd, Fort, Bombay 400001; Ph: 260529; Mg Partner: H J Dharamsey, Ph (resi): 261765. Products: Aluminium foil caps. Brand Name: SB Alucaps.

SPICK INDIA PVT LTD, 15/2 Milestone, Mathura Rd, Faridabad 121002; Ph: 8124801/2; Mg Dir: Satish Sarin. Product: Flexible packaging laminates.

STANDARD PACKAGINGS, 'Gorantla Nilayam', 5 Sir Theagaraya Rd, T Nagar, Madras 600017; Ph: 447168. Products: Hessian laminates, HDPE, multiwall sacks.

STANDIPACK, 25 Community Centre, East of Kailash, New Delhi 110065; Ph: 6431763, 6431766, Gram: Unibox, Tlx: 031-62979; Advisor: Kamal Meattle, Ph (resi): 3012289; Product Mgrs: Wg Cdr D P Sood, Sunil Jain. Branches — Bangalore: 41 Cunningham Rd Cross, -560052; Ph: 73999; Bombay: Manek Mahal, 7th Floor, Veer... Nariman Rd, -400020; Ph: 294831. Product: Multilayer co-extruded plastic film. Brand Name: Standipack.

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Ph: 555955; Mg Partner: S R Saha; Partner: M M Chandra. Products: Lead seals, sealing wires/pliers.

SUHAS INDUSTRIES, 27-B Krishnapuri, Manjalpur, Vadodara 390011; Ph: 42153, Gram: Kunjmac; Prop: S R Patel; Mgrs: Rajesh R Patel, Prakash R Patel. Products: Lock-stoppers, rubber parts and dairy appliances.



SUPREME INDUSTRIES LIMITED, THE, 612 Raheja Chambers, Nariman Point, Bombay 400021; Ph: 220072, 223604, 231978, Tlx: 011-4013; Mg Dir: M P Taparia; Exec Dir: S J Taparia; Dir: Vijay K Taparia; Gen Mgr: J M Totala. Factories — Bombay: 17/18 Shah Indl Estate, Veera Desai Rd, Andheri (W), -400058; Ph: 579693, 576376; Jalgaon: D-101 MIDC Area, -425003; Taloja: (Tk Parvel, Dist Raigad): Plot No 3, E-3, MIDC Area; Ph: 206, 207. Products: Flexible packaging materials, multilayer co-extruded film, thermoplastic sheets, crates, ear tags, PVC pipes fittings, industrial items.,

SYNTHETIC FOAMS LIMITED, 306 Bhandari House, 91 Nehru Place, New Delhi 110019; Ph: 6413244, 6410543, Tlx: 011-4795; Mg Dir: U C Agrawal; Mktg Mgr: Rajeeva Kansal. Products: Rigid polyurethane foam thermal insulation. Brand Name: Multipurl.

TAMILNADU DAIRY EQUIPMENT MANUFACTURING INDUSTRIAL COOPERATIVE SOCIETY LTD, Ind 819, Coimbatore 600021; Ph: 86211, Gram: Tandics; Special Offr: S Sheik Mohammed; Mgr: P Murugesan. Products: Aluminium milk cans, dairy eqpts, Artificial Insemination eqpt crates. Brand Name: Tandics.

DR TARA CHAND & SONS, B-113 Kalkaji, New Delhi 110019; Ph: 6430082, Gram: Castrator; Prop: J K Babbar. Products: AI eqpt.

BUY TIME; GOOD-BYE WASTE!

Cut down all the time now wasted in locating all the facts needed for success in the dairy business. This copy may not be adequate for your organization. Order additional copies... before the stocks run out!

This YEARBOOK is a complete information service at your finger-tips: the most authentic, authoritative and upto-date on what's happening — databook-cum-directory-cum-who's who... in short, a mini-encyclopedia.



TARAPUR PACKAGING INDUSTRIES PVT LTD, 102 Atlanta, 10th Floor, Nariman Point, Bombay 400021; Ph: 243293, 225385, 242321, Gram: Alpasalpa, Tlx: 011-4106 SEPL IN; Mg Dir: H C Parekh, Ph (resi): 216670; Chief Exec: N R Muni; Sales Exec: K J Malkan. Products: Kraft paper laminated to hessian bags, for packing of skimmed milk powder, LDPE liners and film.

THREE ACES ENTERPRISES, 3214 Lal Darwaza, Bazar Sita Ram, Delhi 110006; Ph: 273401; Partners: Ashu Tandon, Ashok Sharma. Works: 107 Ghondli Lal Quarters, Krishna Nagar, Delhi 110051. Products: Paper cups, etc for ice cream.

TOPPS ENTERPRISES, D-23 Model Town, Delhi 110009; Ph: 7115998; Prop: S Khanna. Products: Nylon and ss clamps for pipelines, rubber gaskets, sample bottles, lock stoppers, centrifuge machines, seal and wire for cans. Brand Name: Topps.

TREND PACK, 4 Arvind Commercial Bldg, Sun Mill Compound, Lower Parel, Bombay 400013; Ph: 4946680; Chief Exec: Bipin N Shah. Products: Foil/paper laminates, plastic sachets/pouches.

TRIWAL BOARD PVT LTD, Rohit Chambers, 2nd Floor, Ghoga St, Fort, Bombay 400001; Ph: 2870853, 2870855, Tlx: 011-3774 FLEX IN; Mg Dir: P A Patel. Factory: Plot No 85-F, GIDC Estate, Vapi, Dist Bulsar; Ph: 681, Tlx: 0173-201 TBPL IN. Product: Corrugated boards and boxes.

UNION CARBIDE INDIA LTD, 1 Middleton St, Calcutta 700071; Ph: 448391, Tlx: 021-7244; Mg Dir: V P Gokhale; Vice-Pres: S Bose; Mktg Mgr: S P Verma. Products: LDPE film, liquid nitrogen containers, refrigerators, tankage and accessories.

UNIPLAST, WZ-22A Manohar Park, Old Rohtak Rd, Delhi 110026; Ph: 503025; Partner: Viresh Tyagi, Ph (resi): 7114038; Mgr: H R Tyagi. Product: Plastic novelties for packing ice creams. Brand Name: Uniplast.

Not listed in this edition???

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For Your Regular Requirements of Ammonia in Road Trailers/Cylinders

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Head Office:

New Raja Building,
98-99, N.R. Road,
Bangalore 560002.

Gram: Myammonia
Phone: 220041

Branch:

306, Sharda Chambers
15 New Marine Lines,
Bombay 400020.
Gram: Mysoamonia
Phones: 311984,
257553

Branch:

Teen Murti Estate,
21, Race Course
Road, Guindy,
Madras 600032
Gram: Myammonia
Phone: 431148

Branch:

Plot No. 37,
Cooperative
Industrial Estate,
Balanagar
(Expansion)
Hyderabad 500037

MYSORE AMMONIA SUPPLY CORPORATION

Registered Office:

823, Power Cable Road,
Baroda 390002
Gram: Mysamonia
Phone: 82233

Administrative Office:

306, Sharda Chambers,
15 New Marine Lines,
Bombay 400020
Gram: Mysoamonia
Phones: 311984,
257553

**Twenty-five years Experience In Ammonia Business
1962-1987**

UNNATI CORPORATION

UNNATI CORPORATION, Ravi Chambers, 3rd Flr, Near GPO, Ahmedabad 388001; Ph: 25257, 26866, 25211, factory: 886060, Gram: Jajam; Mg Partner: Janak G Nanavaty, Ph (resi): 412366. Branch: 24-B Hamam St, Fort, Bombay 400001; Ph: 272503; Mgr: Dilip P Shah. Products: Suppliers for sachet filling machines, Teflon coated glass cloth for horizontal and vertical sealing and OSA tapes.

VAZIR GLASS WORKS LTD, M Vasanti Rd, Andheri (E), Bombay 400059; Ph: 576341, Gram: Vazirglass, Tlx: 011-4148; Mg Dir: Yaseen A Vaziralli; Mktg Mgr: K K Nair. Product: Bottles. Brand Name: Nosol, VGW.

VENUS TRADING COMPANY, 'Venus Estate', Near Nalanda Society No 1 & 2, PB No 17, Anand 388001, Gujarat; Ph: 471, 273, Gram: Venus; Partners: M S Pandya, V S Pandya. Products: Lock stoppers, pasteurizers and chillers, gaskets, rubber packings, mechanical shaft seals.

VIDYUT UDYOG, 5 Fancy Lane, Calcutta 700001; Ph: 238155, 235896, 239017, Gram: Bajaj-insu. Branch: Kanji Gokuldas Bldg, 158 Kantilal M Sharma Marg (Lohar Chawl), Bombay 400002; Ph: 317035, Gram: Bajaj-insu. Agents — Bangalore: Bajaj Insulators, 234, B K Garudachar Complex, 3rd Floor, Chickpet, -560053; Hyderabad: General Electronic Corpn, 24-26 Suryodaya Complex, 2-2-120/131 M G Rd, -500003. Products: PTFE coated fibre-glass cloth and tape.

VIJAY TRADING CORPORATION, 152 Narayan Dhuru St, 1st Floor, Bombay 400003; Ph: 324153, 337947, Gram: Samtycans. Products: Valves (Manufactured by Larsen & Toubro Ltd). Brand Name: Audco.

VIKAS RUBBER INDUSTRIES, WZ-932/H Tanwar Marg, Basai Darapur, Opp Ramesh Nagar Bus Stop, New Delhi 110015; Ph: 530940; Mg Partners: Chetan Kumar, Ph (resi): 7212475, Arvind Bhaskar, Ph (resi): 5430045. Products: Rubber spares for dairy plants, spare parts for Prepack machine; shaft seals for milk pumps; ss fittings, can scrubbers and brushes, chiller/pasteuriser gaskets. Brand Name: Milkyway.

WARDEN & COMPANY (INDIA) PRIVATE LIMITED, Plot No E-2, Rd No 15, Wagle Industrial

Estate, Thane 400604; Ph: 596268, 591376, Gram: Inwarden, Tlx: 11-75212; Dir: E R Viccajee. Product: SMP bags. XPRO INDIA LIMITED, F-45 NDSE-1, New Delhi 110049; Ph: 693940, 619341-3, Gram: Multilayer, Tlx: 031-61629 VXLD IN; Pres: D K Goyal; Gen Mgr: V C Agerwal; Mktg Mgrs: C Bhaskar, Ravi Kumar. Regd Off: 9/1 R N Mukherjee Rd, Calcutta 700001. Factory: Plot No 3, NIT, Faridabad 121001; Ph: 8124067, 8126305. Products: Multilayer plastic films.



ZENITH TIN WORKS PVT LTD, Keshavrao Khade Marg, Opp Race Course, Mahalaxmi, PB No 7941, Bombay 400034; Ph: 4949990 (10 lines), Gram: Zenithtins, Bombay 400023, Tlx: 11-75189 ZTIN IN; Mg Dir: M S Barodawala; Dir: H A Barodawala; Sales Mgr: U V Shenoy. Branch: National Highway No 8, Chhani 391740, Dist Baroda; Ph: 7477, 7595, 7594, Gram: Zenithtins, Tlx: 175-310 ZTIN IN. Products: Aluminium collapsible tubes, aluminium pilfer proof caps, vacuum flask containers, metal trays, OTS cans, tin containers. Brand Name: Zenith.

Late Additions

ASIAN CAN LIMITED, A-6 Neeti Bagh, New Delhi 110049; Ph: 663762, 663763, Gram: Can-o-can, Tlx: 031-62016 ASIA IN; Mg Dir: Rakesh C Jain, Ph (resi): 663761; Dir: Rajiv Jain. Regd Office & Works: 96 km, Delhi-Jaipur Highway, Bawal, Dist Mohindergarh, Haryana. Product: Metal cans. ASIATIC PLASTIQUES, 32, Ezra St, 3rd Floor, Calcutta 700001; Ph off: 261903/7349; factory: 666194, Gram: Processors; Partner: B P Khemka, Ph (resi): 353328. BABRI PACKAGING PRIVATE LIMITED, B-46 Naraina Industrial Area, Phase II, New Delhi 110028; Mg Dir: Ravindra Kumar. Products: Flexible packing laminate pouches. BAKERBOY MACHINERY & CO, Near Ice Factory, Modhera 384212, Dist Sabarkantha, Gujarat. Products: Biscuit cones, cups, etc. BRIGHT BROTHERS LIMITED, 156-A J Dadaji Rd, Tardeo, Bombay 400034; Ph: 4945342,

Gram: Bribos (Bycula), Tlx: 011-75066
 BBL IN; Divl Mgr: Rajeev Bhide. Branch:
 47-E Connaught Place, New Delhi 110001;
 Ph: 350230, Gram: Bribos, Tlx: 031-3827;
 Mgr: A L Talwar. Products: Plastic con-
 tainers. Brand Name: Brite.

CHANDRA ENGINEERS & SUPPLIERS, 37 Subhash
 Nagar, Ambala Rd, Saharanpur 247001;
 Prop: Chandra Kumar. Products: Bends,
 Can fillings valves, Micro valves, Plug-
 cock, SS Unions, Small-vessels, Tee.

CHINTAL RUBBER INDUSTRIES, 235 Spectrom
 Commercial Centre, Near Relief Rd,
 Ahmedabad 380001. Products: Rubber and
 Ebonite parts.

FAIRDEAL RUBBER & PLASTIC INDUSTRIES, J-39,
 S-Block, MIDC, Bhosari, Pune 411026; Ph:
 85713; Prop: Shyam Hegde; Sr Exec: Murli-
 dhar Hegde. Branch: 28 Sadguru Indl
 Estate, Off Aarey Rd, Goregaon (East),
 Bombay 400063; Ph: 681125, 693813; Mgr:
 Janardhan. Products: Cream separator
 packings, Compressor rubber rings, IDF &
 SMS packings, Manhole gaskets for milk
 tanks and road milk tankers, 'O' Rings,
 Rubber spares for air compressors. Brand
Name: Fairdeal.

FLOW CONTROL INDUSTRIES, 27-A Shukla Estate,
 Singh Compound, S V Rd, Opp Veena Dalvi
 Indl Estate, Jogeshwari (W), Bombay
 400102; Ph: 627043, 573977. Product: Valves.

GARG PLASTICS, C-14 Panki Indl Area, Site
 No 1, Kanpur 208022; Ph: 220492, 220264,
 Gram: Newplast, Tlx: 032-351 GARG IN;
 Chief Exec: P D Garg, Ph off: 221444,
 resi: 244169. Product: Multilayer film.
Brand Name: GP.

GENERAL METALLISERS PRIVATE LIMITED, 21 Dr
 V B Gandhi Marg, Bombay 400023; Ph:
 235106, 234228, Gram: Vacumet, Tlx: 011-
 2518. Products: Vacuum metallised paper.

GUPTA CORPORATION, 335 Alijalal Bldg, E R
 Rd, Pydhonie, Bombay 400003; Ph: 334886,
 Gram: Muradba; Prop: Shri Nivas Gupta.
Factory: Anand Koliwada, Near Railway
 Crossing, Mumbra, Dist Thane. Product:
 Fruit preserves. Brand Name: Rocket.

HBL PLASTICS (Div of Hindustan Belting &
 Spinning Mills Ltd), 259 Kalbadevi Rd,
 Bombay 400002; Ph: 2025809, 2024555;
 Mg Dir: Arvind Y Sowani, Ph (resi):
 6144005; Sales Exec: S P Engineer. Pro-
duct: Multilayer co-extruded plastic
 films.

HINDUSTAN REFRIGERATION STORES, 4 Netaji
 Subhash Marg, Daryaganj, Delhi 110002;
 Ph: 277725; Tech Dir: Jaspal Singh. Dry
 Ice Section: 23 Park Area, Karol Bagh,

New Delhi 110005; Ph: 521273, 522852.
Product: Dry ice.

IMPERIAL REFRIGERATION CO, 3830/1 David St,
 Daryaganj, New Delhi 110002; Ph: 278820.

JBA PRINTING INKS LIMITED, A1/3 GIDC Indl
 Estate, Naroda, Ahmedabad 382330; Ph:
 811096, 813208, Gram: Bestinx; Branch
 Mgr: N M Desai. Registered Off: Lal Baha-
 dur Shastri Marg, Bhandup, Bombay 400078;
 Ph: 5611471/2, 5600312; Mg Dir: Ms Aruna
 Advani. Branches — Calcutta: 211/207
 Upen Banerjee Rd, Behala, -700060; Ph:
 776595, 775495, Tlx: 021-2140; Madras:
 Plot No 76, Ambattur Indl Estate, -600058;
 Ph: 651221, 651321, Tlx: 41-7365; Nagpur:
 Shed A-7, Plot B-11, MIDC Indl Estate,
 Hingana Rd, -440016; Ph: 7324, Tlx: 0715-
 325; New Delhi: A-42 Mayapuri Indl Area,
 Phase II, Rewari Line, -110064; Ph:
 591844, 591007, Tlx: 031-2977. Product:
 Printing ink. Brand Name: JBA.

JUPIER RUBBER INDUSTRIES, Opp Rly Station,
 Near Patel Estate, Thasra 388250, Gujarat.
Product: Rubber and Ebonite parts.

LA-PACK WATCHES PVT LTD, Plastics Div, 13-
 14 Sector 5, Parwanoo 173220, Himachal
 Pradesh; Dir: Anil Aggarwal, Ph (resi):
 31094 (Chandigarh); Exec Dir: Bhupinder
 Goel. Product: Co-extruded plastic film.
Brand Name: LPPL.

MYSORE AMMONIA PVT LTD, New Raja Bldg, 98-
 99 N R Rd, Bangalore 560002; Ph: 220041,
 220989, 222211, 228421, Gram: Myammonia;
 Dir: Prahlad J Chabria, Ph (resi): 361682.
Branch: 306 Sharda Chambers, 15 New
 Marine Lines, Bombay 400020; Ph: 311984,
 257553, Gram: Mysamonia; Dir: Manohar-
 lal J Chabria, Ph (resi): 8220100. Pro-
duct: Ammonia gas.

PAPERCOAT & PRINT PVT LTD, 203/204 Neelkanth
 Marine Drive, Bombay 400002; Ph: 297445.
Product: Flexible packaging materials.

RECOTON ENGINEERING CORPORATION, 89/2/1
 Bangal Para 2nd Lane, Howrah 711104; Mg
 Partner: S K Mondal. Product: Stainless
 steel valves and cattle feed plant eqpt.
Brand Name: Recoton.

STANDARD ORINGSHAM, 28 Sadguru Industrial
 Estate, Off Aarey Rd, Goregaon (East),
 Bombay 400063; Ph: 681125, 693813; Mg
 Partner: Shyam Hegde, Ph (resi): 6405098;
 Mgr: Janardhan. Products: Rubber gaskets
 for plate pasteurisers. Brand Name: Sumite

VIJAY STEEL INDUSTRIES, Near Arya Samaj,
 Station Rd, Anand 388001; Ph: 1024; Part-
 ners: Jashbhai A Patel, Mukesh J Patel.
Products: SS pipe fittings/valves, feed
 plant eqpt. Brand Name: Vijay.



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Increase your profits*

TPI Industrial packaging covers a wide range of products including Cement, Cement Paints, Chemicals, Animal Feed, Milk Powder, PVC Resins, Fertilizers and Pesticides.

You can choose packaging materials suitable to your products from:

- * Kraft paper laminated to Hessian/ PP/HDPE bags
- * HDPE/PP-woven sacks flat/circular (laminated/ unlaminated)
- * Multiwall paper sacks
- * PP/HMHD/LDPE films/liners/ milk pouches
- * Poly bags with multi-colour rotogravure printing
- * Flexible jumbo containers
- * HDPE/PP-laminated tarpaulins/ food covers/ stockpile covers



Tarapur Packaging Industries Pvt. Ltd.

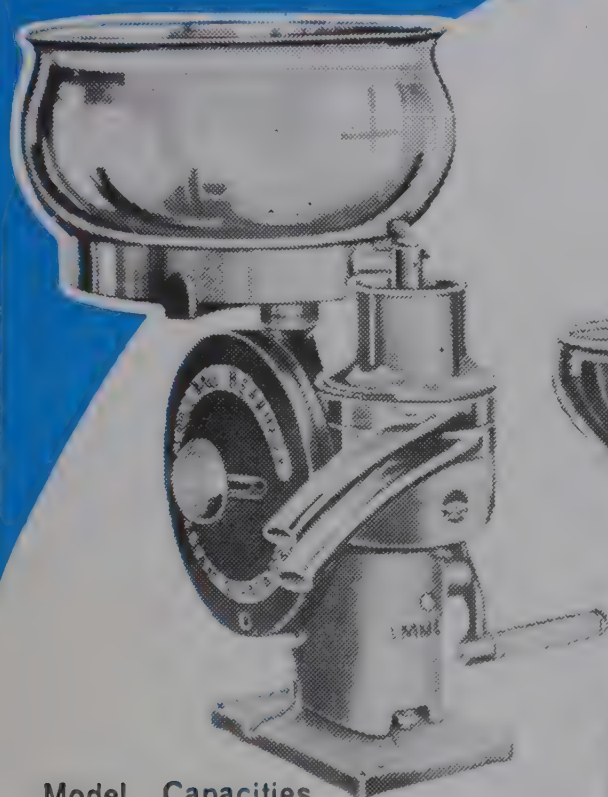
Registered Office: 102, Atlanta, 10th Floor, Nariman Point, Bombay-400 021.
Phone: 243293/225385/242321. Grams: ALPASALPA. Telex: 011-4106 SEPL IN

A SYMBOL OF EXCELLENCE IN PACKAGING

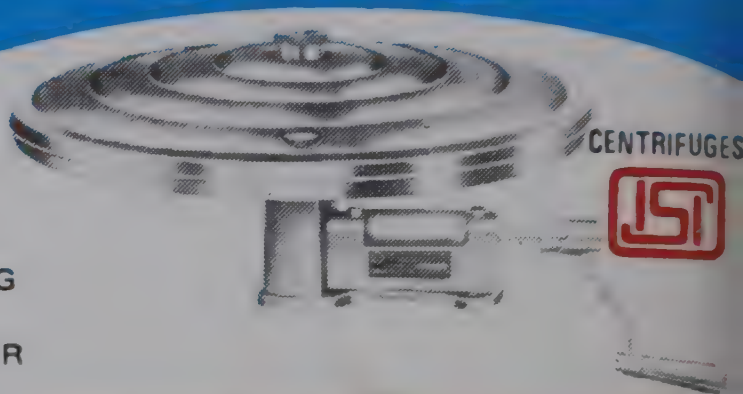


LOCK STOPPER
WITH  MARK

Lmmco
DAIRY EQUIPMENTS



BALL
BEARING
FOR
GREATER
SPEED
AND
EASIER
WORK



CENTRIFUGES



TYPE	CAPACITY	
RS or SS 7	60 L/hr	Hand Operated
RS or SS 8	100 ..	-do-
RS or SS 9	165 ..	Hand or Electric Operated
RS or SS 10	225 ..	-do-
RS or SS 11	300 ..	-do-
RS or SS 12	400 ..	-do-
RS or SS 13	550 ..	-do-
SSS - 109	750 ..	-do-

Model	Capacities
RS-7	60 Litres/hr.
RS-8	100 " "
RS-9	165 " "
RS-10	225 " "
RS-11	300 " "
RS-12	400 " "
RS-13	550 " "
L-109	750 " "

OUR OTHER PRODUCTS

Centrifuges	Strainers
(Hand &	Plungers
Electrical)	Dippers
Butyrometers	Brushes
Lock-stoppers	Sealing Wire
Pipettes	Lead Seals &
Lactometers	Butter
Thermometers	Equipment
Milk Cans	



Manufacturers :
LAKSHMI MILK TESTING MACHINERY CO.
DAIRY EQUIPMENT ENGINEERS

A-90, Group Industrial Area, Wazirpur, Delhi-110052

Phones: 7125171, 7219358, res: 7215121, 7119050 • Telex: 31-63194 CHDA IN

Contact Office: 137 Rajindra Market, Tis Hazari, Delhi 110054

Phones: 2511416, 2518477

Buyer's Guide

This handy Buyer's Guide lists suppliers of dairy consumables productwise. The address and other details of each of these companies can be obtained from the main listing.

A.I. & VETERINARY INSTRUMENTS

Daaps Intraco Pvt Ltd
Dr Tara Chand & Sons
India Tag Industries
Indian Dairy Machinery Co
Insemination & Dairy
Equipment
President Equipment
Industries
Tamil Nadu Dairy Equipments
Mfg & Indl Coop Soc Ltd

Veterinary Flask

Eagle Flask Pvt Ltd

Ear Tags

Ami Enterprises
Daaps Intraco Pvt Ltd
India Tag Industries
Supreme Industries Limited

BOTTLING SYSTEMS

Bottle Manufacturers

Ajit Glass Works Pvt Ltd
Alembic Glass Industries
Ltd (Late additions)
Associated Glass Industries
Borosil Glass Works Ltd
Haldyn Glass Works Pvt Ltd
Hindustan National Glass &
Industries Ltd
Krishna Silicate & Glass
Works Ltd
Mahalakshmi Glass Works Pvt
Limited
Vazir Glass Works Ltd

Caps

Ajanta Traders
Chadha Sales Pvt Ltd
Crown Cork Manufacturers
(P) Ltd
Dairy Equipment Company
Kishor Trading Corporation

Ram Kumar & Bros
Sangli Dairy Farm
Somchand Brothers
Zenith Tin Works Pvt Ltd

DAIRY PLANT CONSUMABLES

Compressor Spares

Compressor Spares
Specialities
Fairdeal Rubber & Plastic
Industries(Late additions)
Refairco

Electromagnetic Clutches & Brakes

Besto Clutches & Spares
Engineering Hindustan
Fairmarks Pvt Ltd

Pipe-fittings

Chandra Engineers & Suppliers
(Late additions)
Chetna Steel Industries
Choksi Tube Co Ltd
Continental Enterprises
Dayry Engineering Services
Pvt Ltd
Dhiraj Traders &
Manufacturers
Indian Dairy Machinery Co
Instruments & Components
Kaktin M Inc
Kpsar Engineering Works
Mody Brothers & Co
Paras Dairy Appliances
Perfect Engineering Works
Vijay Steel Industries
(Late additions)

Rubber Gaskets/Parts

Anjna Trading Corporation
Bharat Sunthetik
Chintal Rubber Industries
(Late additions)
D G S Company

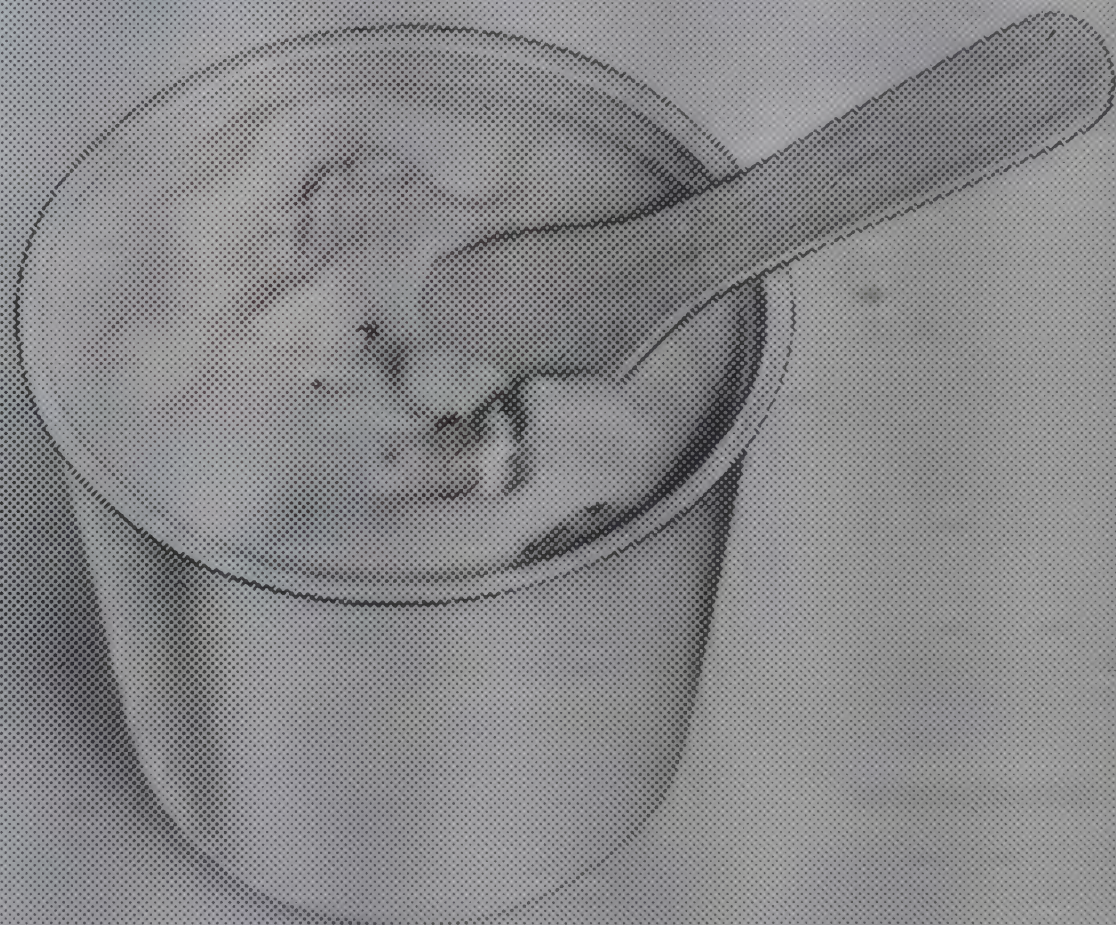
Fairdeal Rubber & Plastic
Industries(Late additions)
Greentose Pvt Ltd
Jupitor Rubber Industries
(Late additions)

Kumar Trading Agency
Paras Dairy Appliances
Standard Oringsham
(Late additions)
Suhas Industries
Topps Enterprises
Venus Trading Co
Vikas Rubber Industries

Valves

Anjna Trading Corporation
BDK Valves Pvt Ltd
Chandra Engineers & Suppliers
(Late additions)
Chetna Steel Industries
D G S Company
Dayry Engineering Services
Pvt Ltd
Dhiraj Traders &
Manufacturers
Flow Control Industries
(Late additions)
Goodwell Industries
Imperial Tube & Hardware Mart
Indian Dairy Machinery Co
Instruments & Components
Kaktin M Inc
Kpsar Engineering Works
M P Valves Manufacturing Co
Mody Brothers & Co
Paras Dairy Appliances
Perfect Engineering Works
R P M Engineers
Recoton Engineering Corpn
(Late additions)
Vijay Steel Industries
(Late additions)
Vijay Trading Corporation

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Ice Cream? Shrikhand? Other dairy products? Maharaja packs it in style for you. In elegant pilferproof plastic. Plastic made with sophisticated German technology in a plant that can turn out upto 50,000 cups a day! The paper age is out - it's plastic time. And Maharaja plastics leave others far behind!



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MAHARAJAH PLASTIC PRODUCTS (INDIA)

5/2 Grants Bldg., 1st Floor, Arthur Bunder Road, Colaba-Bombay 400 005
Tel: 245016, 245117

PACKAGING MATERIALSAluminium Foil

Garware Plastics & Polyester
Pvt Ltd

India Foils Limited
Indian Aluminium Co Ltd

Butter Paper

K M Feil Pvt Ltd
Paper & Card Wares

Cartons

Colour Cartons Limited
I T C Limited
Metal Box India Ltd
Packing Products Pvt Ltd
Triwal Board Pvt Ltd

Corrugated Boxes

I T C Limited
Pack-O-Well
Pick N Pack Industries
Rolsfri Cores Pvt Ltd
Saurashtra Packaging Pvt Ltd
Triwal Board Pvt Ltd

Flexible Plastic LaminatePouches

Babri Packaging Pvt Ltd
(Late additions)
Caprihans India Ltd
Eagle Lithographing Co
(P) Ltd
Essel Packaging Ltd
Flex Lamintors Pvt Ltd
Guardian Plasticote Ltd
Kay Packagings Pvt Ltd
Packing Products Pvt Ltd
Papercoat & Print Pvt Ltd
Spick India Ltd
Standard Packagings
Standipack
Supreme Industries Ltd
Tarapur Packaging Industries
Private Limited
Trend Pack

Hessian Bags

Atlas Laminate Industries
Babu Lall & Son
NTV Multiwall Paper Bag
Co Pvt Ltd
Standard Packagings
Tarapur Packaging Industries
Private Limited

Ice Cream Packaging Material

Apex Flexibles
Century Plastics
Das Bros & Co
Hindustan Paperwares
Luthra Paper Corporation
Maharaja Plastic Products
(India)

Plast Kraft Industries
Three Aces Enterprises
Uniplast

Laminated Paper

Hindustan Packaging Co Ltd

Multi-wall Paper Bags

Multisak Corporation
NTV Multiwall Paper Bag Co
Pvt Ltd
Overseas Packaging Industries
Pvt Ltd
Pack-O-Well
Standipack
Tarapur Packaging Industries
Private Limited
Warden & Co (India) Pvt Ltd

Paperboards for Packaging

Ballarpur Industries Limited
Bhadrachalam Paperboards Ltd

Plastic Containers

A-1 Plastics
Ami Polymers
Bright Brothers Limited
(Late additions)
Century Plastics
Commercial Plastics
Indian Plastic Forming Co
Maharaja Plastic Products
(India)
Mutual Plastics
National Products
Plast Kraft Industries
Rumi Plastics
Shamrock Plastics

Plastic Films

Anand Polyrotex
Ansart Plastics Pvt Ltd
Ase Pack (P) Ltd
Batra Associates Pvt Ltd
Caprihans India Ltd
Ecoplast Pvt Ltd
Exoplast Private Limited
Finnpack (India) Ltd

Flex Laminators Pvt Ltd
Flexaire
Garg Plastics (Late additions)
Gyan Packaging Industries
Private Limited
HBL Plastics (Late additions)
Jandwani Poly Products P Ltd
Kay Packagings Private Ltd
La-Pack Watches Pvt Ltd
Multifilms Plastics Pvt Ltd
Multilayer Composites Pvt Ltd
Packing Products Pvt Ltd
Performance Plastics Pvt Ltd
Poly Pouch Industries
Prime Plast Pvt Ltd
Rainbow Plastic Industries
Saras Polypack Pvt Ltd
Shakti Co-extrusion Pvt Ltd
Shakti Enterprises
Standipack
Supreme Industries Limited
Tarapur Packaging Industries
Private Limited
Xpro India Ltd

Thermocole

BASF India Limited
Beardsell Insulation Limited

Tin Containers

Asian Cans Limited
(Late additions)
Balmer Lawrie & Co Ltd
Dairy Udyog
Foremost Containers Ltd
Kaira Can Co Ltd
Klas Engineering Pvt Ltd
Merigold Containers Ltd
Metal Box India Ltd
Milk Containers Industry
Mohan Industry
Omega Packaging Pvt Ltd
Oriental Containers Ltd
Poysha Industrial Co Ltd
Tin Box Co
Zenith Tin Works Pvt Ltd

PLASTIC CRATES

A-1 Plastics
Indian Plastics Ltd
Mutual Plastics
Mutual Steel Industries
National Products
Nilkamal Plastic & Allied Ind
Shamrock Plastics
Supreme Industries Limited

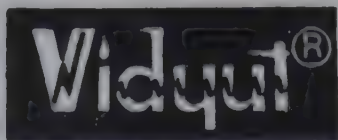
P.T.F.E. COATED FIBREGLASS CLOTH

- Horizontal Cloth
- Vertical Cloth
- Silicone Adhesive Coated
Tapes for sealing milk
pouches



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Dairy Cooperatives

District Cooperative Unions engaged in milk production, procurement, processing and marketing are listed below, regionwise. Basic information about them like the number of primary societies covered, collection centres and quantity of milk procured is indicated, where available. Most of these Unions also have extension services like artificial insemination, health cover including vaccination and mobile clinics, feed and fodder.

Andaman & Nicobar

SOUTH ANDAMAN COOP MILK PRODUCERS' UNION LTD, THE, Dairy Farm, PO Junglighat, Port Blair 744103; Gram: Milkunion; Mg Dir: Dr S Ranaque Hussain. Soc: 15, Mems: 950. Milk Proc, Nov 85: 500 lpd, Apr: 86: 460 lpd.

Andhra Pradesh

CHITTOOR DIST COOP MILK PRODUCERS' UNION LTD, Chittoor. Soc: 432, Mems: 25,000. Av Milk Proc: 122,000 lpd.

CUDDAPAH DIST MILK PRODUCERS' COOP UNION LTD, Milk Products Factory, Proddutur; Ph: 2853; Gen Mgr: V Ranga Rao, Ph (resi): 2418. Soc: 186, Mems: 12,000, Av Milk Proc: 40,000 lpd.

GODAVARI DIST MILK PRODUCERS' COOP UNION LTD, H No 20-3, Upstairs Ratna Plastics, Alcot Gardens, Rajahmundry 500101, East Godavari Dist; Gen Mgr: Dr P Chandra-sekhara Reddy, Ph: 4480. Soc: 373, Mems: 21,000. Av Milk Proc: 39,000 lpd.

GUNTUR DIST MILK PRODUCERS COOP UNION LTD, THE, Sangam Dairy, Vadlamudi 522213; Ph: 3711, 3712, 3713 (Tenali Ex), Gram: Sangamilk, Tlx: 471-279; Gen Mgr: Dr T Krishna Murthy, Ph (resi): 3715; Dep Gen Mgr (P&P): Dr V Ch Subba Rao; Dep Gen Mgr (P&I) i/c: Dr M V G Ahobala Rao; Dep Gen Mgr (F&A): M Gangadhar. Milk Chilling Centres: Gurazala, Narasaraopet. Milk Supply Offices: Baptla,

Chilakaluripet, Chirala, Guntur, Mangalagiri, Ponnur, Tenali. Soc: 523, Mems: 80,000. Milk Proc, Oct 86: 1,05,000 lpd.

KRISHNA DIST MILK PRODUCERS' COOP UNION LTD, THE, Milk Products Factory, Vijayawada 520009; Ph: 75241 (6 lines), Gram: Milk House, Tlx: 232; Gen Mgr: Dr K V Pitchaiah, Ph off: 64527, resi: 74346; Plant Mgr: K Durga Prasada Rao, Ph (resi): 52561; Quality Control Offr (Inspection): K Srihari Rao, Ph (resi): 52901. Soc: 318, Mems: 30,682. Milk Proc, Nov 85: 1,01,608 lpd, Apr 86: 1,63,947 lpd.

KURNOOL DIST COOP MILK PRODUCERS' UNION LTD, Kurnool. Soc: 244, Mems: 20,000. Av Milk Proc: 39,000 lpd.

NALGONDA DIST MILK PRODUCERS' COOP UNION LTD, Nalgonda. Soc: 249, Mems: 19,000, Av Milk Proc: 39,000 lpd.

NELLORE DIST MILK PRODUCERS' COOP UNION LTD, Nellore Dairy, Nellore 524002; Ph: 4614; Gen Mgr: Dr N Prabhakar Rao, Ph (resi): 5814.

NIZAMABAD DIST COOP MILK PRODUCERS' UNION LTD, Nizamabad. Soc: 252, Mems: 18,000. Av Milk Proc: 34,000 lpd.

PRAKASAM DIST MILK PRODUCERS COOP UNION LTD, Ongole Dairy, Ongole 523001; Ph: 3059; Gen Mgr: Dr R Koteswar Rao, Ph (resi): 2591. Soc: 202, Mems: 15,000. Av Milk Proc: 46,000 lpd.

VIJAYA VISAKHA DIST MILK PRODUCERS' COOP UNION LTD, Visakha Dairy, Visakhapatnam; Ph: 7555; Gen Mgr: Dr L Lakshmipathi Raju, Ph (resi): 64550. Soc: 389, Mems: 38,000. Av Milk Proc: 53,000 lpd.

SURAT DISTRICT CO-OPERATIVE MILK PRODUCERS' UNION LIMITED

"SUMUL" DAIRY

POST BOX NO. 501

SURAT 395 008

Registered on 22.8.1951



SOME HIGHLIGHTS OF ACHIEVEMENTS

SUMUL PROCURES about 5.30 crore kg of milk annually from its 96,836 members of the 674 affiliated village co-operatives.

- OUT OF 5.30 CRORE KG, ABOUT 1.00 CRORE KG of it now comprises cow milk (as against 20-22 lakh litres only, a few years back), thanks to the commencement and intensification of cross breeding in cows in the operation area.
- ABOUT TWO-THIRDS OF SUMUL'S TOTAL MILK PRODUCERS comprise Adivasis, who contribute as much as 70% of the total milk procured.
- THE AVERAGE PRICE PAID to the producers comes to the tune of Rs 4.35/kg for buffalo milk and Rs 3.25 kg for cow milk.
- DESPITE THE FARTHEST POINT OF COLLECTION BEING AT 193 KM, the annual sourage of milk is only within 1.5%, thanks to the two chilling centres operating at strategic places round the year.
- THE SUMULDAN FACTORY MANUFACTURES AND SUPPLIES around 37,000 MT of compounded cattle feed annually to its members by running at its full capacity round the year.
- THE TOTAL ANNUAL SALES PROCEEDS OF THE UNION are to the tune of Rs 37.00 crores.
- ELEVEN MOBILE VETERINARY UNITS treat as many as 73,650 cases on weekly routes in the villages annually, at a nominal cost.
- SUMUL CATERS THE SUPPLY OF GOOD QUALITY PASTEURISED/STANDARDISED MILK in about 2.6 lakh bottles/pouches and 50,000 tetrapaks, through its 408 organised sales counters twice a day and covers about eighty per cent population of the sprawling city of Surat round the year.
- SUMUL HAS CONSISTENTLY MAINTAINED "A" GRADE in its Audit classification year by year.

MAGANBHAI P. PATEL
Chairman

THAKORBHAI D. PATEL
Managing Director

Assam

CACHAR & KARIMGANJ DIST MILK PRODUCERS' COOP UNION LTD, Netaji Subhash Avenue, Silchar 788005; Ph: 539, Gram: Camul; Mg Dir: A Choudhury, ACS, Ph (resi): 485. Soc: 84, Mems: 2,100. Milk Proc, Nov 85: 28,302 lpd, Apr 86: 34,743 lpd.
D S D COOP MILK PRODUCERS' UNION LTD, Nali, Jorhat 785001; Ph: 400; Mg Dir: Dr M Ali.

WEST ASSAM MILK PRODUCERS' COOP UNION LTD, U N Bezboruah Rd, Silpukhuri, Guwahati 781003; Ph: 26874; Mg Dir: Dr N N Bora. Milk Proc, Nov 85: 4,362 lpd, Apr 86: 3,740 lpd.

Bihar

PATLIPUTRA SAHKARI DUGDH UTPADAK SANGH LTD, c/o Patna Dairy Project, B-9 Shrikrishnapuri, Patna 800001; Ph: 22685, Gram: Care Dairyboard, Tlx: Care 022-215; Chmn: Dharmendra Prasad; Gen Mgr: Dr Jagjit S Punjraath, Ph off: 22685 & 26347, resi: 63439; Mgr (Milk Proc & Tech Input): N Sreeman Narayana, Ph: 63518. Soc: 588, Mems: 12,239. Milk Proc, Nov 85: 18,900 lpd, Apr 86: 12,500 lpd.

SAMASTIPUR SAHKARI DUGDH UTPADAK SANGH LTD, Samastipur 848101. Soc: 132, Mems: 2,000. Av Milk Proc: 3,000 lpd.

VAISHALI SAHKARI DUGDH UTPADAK SANGH LTD, Hajipur 844101.

Goa

GOA DIST COOP MILK PRODUCERS' UNION LTD, Curti, Ponda, Goa 403401; Ph: 247, Dairy: 92, Gram: Goadairy; Actg Mg Dir: P K Ghathe; Addl Mgr: S G Naik; Shift Supdts: V C Panvelker, R D Revonker, P V F Dessai; Milk Proc Offr: D P Bhatiker. Soc: 85, Mems: 7,500. Av Milk Proc: 12,000 lpd.

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Gujarat



AHMEDABAD DIST COOP MILK PRODUCERS' UNION LTD, "Ajod Dairy", Near Sukhram Nagar, Gontipur, Ahmedabad 380021; Ph: 366459, 364853, 368206, Gram: Ajodairy; Chmn: C R Biswas; Mg Dir: Dr M C Vyas; Gen Mgr: U J Vaishnave, Ph (resi): 411306; Sr Mgr: M U Gurjar; Mgr (Dairying): S R Bharwad, Ph (resi): 812175. Soc: 308, Mems: 29,216. Milk Proc, Nov 85: 71,935 lpd, Apr 86: 58,819 lpd.



Banas

BANASKANTHA DIST COOP MILK PRODUCERS' UNION LTD, PB No 20, Palanpur 385001; Ph: 2259, 2621, 2622, Gram: Banasdairy, Tlx: 0121-289; Mg Dir: Dr R Saini, Ph (resi): 2322; Mgr (Production): R P Pavaya. Soc: 1,089, Mems: 75,200. Milk Proc, Nov 85: 179,294 lpd, Apr 86: 113,520 lpd.



BARODA DIST COOP MILK PRODUCERS' UNION LTD, Baroda Dairy, Makarpura Rd, Baroda 390009; Ph: 555066, 555322, 555220, Gram: Barodairy, Tlx: 0175-294; Mg Dir: Hemendra R Dholakia; Mgr (Production): Govindbhai M Patel. Soc: 699, Mems: 104,086. Milk Proc, Jan 85: 130,186 lpd, June 85: 55,630 lpd.



BHARUCH DIST COOP MILK PRODUCERS' UNION LTD, Dudh Dhara Dairy, PB No 29,



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Products:

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- GOKUL Ghee
- GOKUL Butter
- GOKUL Shrikhand

and

Mahalaxmi Cattle Feed

Established in the year 1963 for upliftment of Milk Producing Farmer Members of 750 Anand Pattern Dairy Co-operative Societies in Kolhapur Milk Shed. Apart from Milk Procurement, Processing and Product Making the Union is engaged in Technical Input Programmes such as Mobile Veterinary Routes, FMD Vaccinations, First Aid Centres, A.I. Activities and Farmers' Training.

S. R. KHADYE
Managing Director

ANANDRAO D. PATIL
(Chuyekar)
Chairman

National Highway No 8, Bholav, Bharuch 392002; Ph: 2048, 2054, Gram: Dudhara; Chmn: Thakorbbhai Chhotabbhai Amin; Gen Mgr: R S Patel. Soc: 227, Mems: 30,000. Av Milk Proc: 18,000 lpd.

BHAVNAGAR DIST COOP MILK PRODUCERS' UNION LTD, Bhavnagar. Soc: 188, Mems: 11,000. Av Milk Proc: 30,000 lpd.

GANDHINAGAR DIST COOP MILK PRODUCERS' UNION LTD, 'K' Rd, Near GIDC Electronic Estate, Sector-25, Gandhinagar 382025; Ph: 2877; Sr Mgr: M C Patel; Mgr: James Joseph. Soc: 10, Mems: 2,707. Milk Proc, Nov 85: 19,000 lpd, Apr 86: 13,000 lpd.

JUNAGADH DIST COOP MILK PRODUCERS' UNION LTD, Jafar-Maidan, Junagadh 362001; Ph: 23131, Dairy: 20478; Mg Dir: G A Patel, Ph (resi): 20410; Dep Mgr (Coop): J P Patel. Soc: 207, Mems: 7,047. Milk Proc, Dec 85: 1,845,568 kg, Apr 86: 1,203,078 kg.

KAIRA DIST COOP MILK PRODUCERS' UNION LTD, Amul Dairy, Amul Dairy Rd, Anand 388001; Ph: 3402 (10 lines), Gram: Amuldairy, Tlx: 0172-208; Mg Dir: V H Shah, Ph (resi): 3190; Gen Mgr (Comm): J M Shah, Ph (resi): 3406; Mgr (Comm): K J Shah; Mgr (Proj): A C Talati; Asst Gen Mgr (Plg & Engg): R N Shah; Mgr (Accts): Ramanlal N Shah; Asst Gen Mgr (Prod): Chimanbbhai V Patel; Asst Gen Mgr (R & D) Mogar: K M Vyas; Addl Mgr (AH & E): Dr Mohan R Subnis; Addl Mgr (Milk Proc): Dr Arvindkumar Sheth. Soc: 882, Mems: 365,000. Av Milk Proc: 625,000 lpd.

KUTCH DIST COOP MILK PRODUCERS' UNION LTD, Kutch. Soc: 190, Mems: 4,000. Av Milk Proc: 16,000 lpd.

MEHSANA DIST COOP MILK PRODUCERS' UNION LTD, Dudhsagar Dairy, PB No 1, Mehsana 384002; Ph: 2201 (5 lines), Gram: Dudhsagar, Tlx: 0122-204; Chmn: Motibhai R Chaudhari; Mg Dir: Babubhai C Bhatt; Gen Mgr (PP & E): Vinodchandra M Patel; Gen Mgr (Comm): Kantilal M Shah; Asst Gen Mgr (PP & E): Madhubhai V Chaudhari. Soc: 889, Mems: 220,000. Av Milk Proc: 578,000 lpd.



PANCHMAHAL DIST COOP MILK PRODUCERS' UNION LTD, THE, Near SRP Camp, Lunawada Rd, PB No 37, Godhra 389001, Panchmahals; Ph: 2660, 2671, Gram: Panchamrut; Gen Mgr: Ravindra Kumar Mathur, Ph (resi):

2531; Asst Mgr (Prod): L J Patel; Asst Mgr (Engg): S A Sheth. Branch Offices: Dahod, Lunawada. Soc: 602, Mems: 64,630. Milk Proc, Nov 85: 56,099 lpd, March 86: 40,300 lpd.

RAJKOT DIST COOP MILK PRODUCERS' UNION LTD, HO: Bungalow No A-3, Dairy Colony, Dudh Sagar Marg, Rajkot 360003; Ph: 87891, Dairy: 87353, 87354, 87147, Gram: Pure-milk; Mg Dir: P M Vachhrajani. Soc: 423, Mems: 25,000. Av Milk Proc: 21,000 lpd.

SABARKANTHA DIST COOP MILK PRODUCERS' UNION LTD, Sabar Dairy, PB No 21, Himatnagar 383001; Ph: 801 to 804, Gram: Sabardairy, Tlx: 012-291 SKMU IN; Chmn: Bhurabbhai K Patel; Mg Dir: Babubhai K Rabari, Ph: 805, resi: 409; Asst Gen Mgr (FOAH): Dr Haribhai K Patel; Asst Gen Mgr (P & E): R S Sheth; Asst Gen Mgr (Finance): S M Shah, Ph (resi): 1050. Soc: 1,292, Mems: 122,596. Milk Proc, Jan 86: 324,666 lpd, June 86: 198,265 lpd.

SURAT DIST COOP MILK PRODUCERS' UNION LTD, Sumul Dairy, PB No 501, Surat 395008; Ph: 27691 to 27695, Gram: Sumul, Tlx: 0178-208; Chmn: Maganbbhai P Patel, Ph: 30072; Mg Dir: Dr Thakorbbhai D Patel, Ph: 31172; Asst Gen Mgr: Ramanbbhai B Patel; Mgr (AH & E): Dr H C Gupta; I/c Mgr (Admn): K C Mistry; Mgr (Engg & Dev): J N Gujarati; Mgr (Prod): M O Shah; Mgr (Sales): Jimmy Engineer; Mgr (QC): S M Naik; Mgr (APS): D M Hulyalkar; Mgr (MP): Dr H A Ghasia; Mgr (Accts): P J Parekh; Mgr (Stores): U M Derasari; Mgr (Vet): Dr M M Jahan; Mgr (Purchase): N J Patel; Mgr (SDF): G G Patel. Soc: 701, Mems: 97,510. Milk Proc, Jan 86: 188,959 lpd, June 86: 93,956 lpd.

SURENDRANAGAR DIST COOP MILK PRODUCERS' UNION LTD, Dairy Bldg, Wadhawancity, Surendranagar 363030; Ph: 1884, Gram: Sunsagar Dairy; Chmn: Vajubhai V Mehta; Sec: Manibhai M Patel. Soc: 275, Mems: 17,000. Av Milk Proc: 43,000 lpd.

VALSAD DIST COOP MILK PRODUCERS' UNION LTD, 'Vasudhara' Dairy, N H No 8, At Alipur 396409, Tk Chikhli, Dist Valsad; Ph: 287, 399 & 423 (Chikhli Exch), Gram: Vasudhara; Chmn: Moghabhai Manibhai Desai; Gen Mgr: Narendra Balvantrai Vashi; Dairy Supdt: Pankajkumar Hasmukhlal Shah. Sales Offices: Navsari, Valsad, Vapi. Soc: 206, Mems: 16,000. Milk Proc, Nov 85: 27,264 lpd, Apr 86: 26,469 lpd.

THE NILGIRIS DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD.

UDHAGAMANDALAM 643001

Phones: 2559 & 3428

Grams: COOPMILK

Established in 1946

**A House of Quality Milk and Milk Products
from 25,000 Farmers**

For

**Pure Cow Ghee
Pure Cow Butter
Pure Cow Table Butter
and
AAVIN CHEESE**

(from Oct. '85 onwards)

A. Md. AZAM
Chairman

Haryana

- AMBALA DIST COOP MILK PRODUCERS' UNION LTD,**
Milk Plant, Ambala City 133001; Ph: 56565, Gram: Vitality; Chief Exec Offr: H S Pannu. Soc: 288, Mems: 21,554. Milk Proc, Nov 85: 35,985 lpd; Apr 86: 38,066 lpd.
- BHIWANI DIST COOP MILK PRODUCERS' UNION LTD,**
Hansi Rd, c/o Milk Plant, Bhiwani; Mg Dir: S K Arora. Soc: 208, Mems: 15,000. Av Milk Proc: 5,000 lpd.
- GURGAON DIST COOP MILK PRODUCERS' UNION LTD,**
578/1 Dayanand Colony, New Rly Rd, Gurgaon; Mg Dir: J P Singla. Soc: 336, Mems: 16,000. Av Milk Proc: 12,000 lpd.
- HISAR DIST COOP MILK PRODUCERS' UNION LTD,**
Milk Plant, Hisar 125001; Ph: 2254; Mg Dir: Z S Sahu, Ph (resi): 2567. Soc: 262, Mems: 13,096. Milk Proc, Dec 85: 23,000 lpd, June 86: 4,900 lpd.
- JIND DIST COOP MILK PRODUCERS' UNION LTD,**
Milk Plant, Jind 126102; Ph: 2704, Gram: Milkunion; Chmn: Satyawar Chahal; Chief Exec Offr: S C Sharma. Soc: 201, Mems: 14,892. Milk Proc, Nov 85: 10,863 lpd, Apr 86: 10,023 lpd.
- KARNAL DIST COOP MILK PRODUCERS' UNION LTD,**
G T Rd Bye-Pass, PB No 84, Karnal 132001; Ph: 4055, Gram: Karanmilk; Chief Exec Offr: Dr R S Rathee, Ph (resi): 2305; Si Milk Proc & Extn Offr: S K Gupta; AI Offr: Dr V K Kalra; Vet Offr: Dr R C Pandey. Soc: 221, Mems: 11,000. Av Milk Proc: 15,000 lpd.
- KURUKSHETRA DIST COOP MILK PRODUCERS' UNION LTD,**
Pipli Rd, Ratgal Gate, Kurukshetra 132118; Ph: 977; Chief Exec Offr: Dr V K Dargar; Sr Milk Proc Offr: Amarjit Singh; AI Offr: Dr J S Dhull; FD Offr: S K Saini. Branch: 278-A Housing Board Colony, Kaithal. Soc: 155, Mems: 6,978. Milk Proc, Nov 85: 14,800 lpd, Apr 86: 16,552 lpd.
- MAHENDERGARH DIST COOP MILK PRODUCERS' UNION LTD,**
Thekedar Rao Ram Kumar Mkt, Narnaul Rd, Rewari 123401. Soc: 315, Mems: 16,000. Av Milk Proc: 3,000 lpd.
- ROHTAK DIST COOP MILK PRODUCERS' UNION LTD,**
Gohana Rd, Rohtak 124001; Ph: 3880; Chief Exec Offr: R K Makrandi, Ph (resi): 4963. Soc: 285, Mems: 19,645. Milk Proc, Dec 85: 30,681 lpd, Apr 86: 3,369 lpd.
- SIRSA DIST COOP MILK PRODUCERS' UNION LTD,**
Begu Rd, PB No 62, Sirsa 125055;

Ph: 21325; Chief Exec Offr: Dr A K Ganju, Ph (resi): 21420. Soc: 216, Mems: 11,512. Milk Proc, Nov 85: 25,323 lpd, Apr 86: 32,780 lpd.

Karnataka

- BANGALORE COOP MILK PRODUCERS' SOCIETIES' UNION LTD,** THE, Behind Bangalore Dairy, Hosur Rd, Bangalore 560029; Ph: 642549, 642597; Mg Dir: Dr P S Chandrashekarappa, Ph off: 642596, resi: 353807; Mgrs: Dr V S Sundaramurthy, Ph (resi): 642158, Dr M N Venkatram. Branches: Channapatna (Ph: 414), Chickballapur (Ph: 129), Chintamani (Ph: 307), Doddaballapur (Ph: 238), Gowribidanur (Ph: 148), Kolar (Ph: 582). Soc: 845, Mems: 142. Av Milk Proc: 234,000 lpd.
- BELGAUM COOP MILK PRODUCERS SOCIETIES UNION LTD,** Belgaum Dairy Premises, Belgaum 590016; Ph: 22791; Mg Dir: Dr B S Gangadhar. Soc: 176, Mems: 18,000. Av Milk Proc: 14,000 lpd.
- D K DIST COOP MILK PRODUCERS' UNION LTD,** Coop Indl Estate, Manipal 576119; Ph: 20104, Gram: Milkunion; Chmn: K K Pai; Gen Mgr: J S Bhatia. Soc: 87, Mems: 17,000. Milk Proc, Dec 85: 6,213 lpd, June 86: 4,069 lpd.
- DHARWAD COOP MILK PRODUCERS SOCIETIES UNION LTD,** Dharwad Dairy Premises, Rayapura, Dharwad; Ph: 80593; Mg Dir: Dr Jayaprakash Reddy. Soc: 214, Mems: 18,000. Av Milk Proc: 12,000 lpd.
- GULBARGA COOP MILK PRODUCERS SOCIETIES UNION LTD,** No 10/2/179 Sangameswaranagar, Gulbarga 585103; Ph: 21981, Gram: Gumul; Mg Dir: Dr M R D Gupta. Soc: 127, Mems: 13,000. Av Milk Proc: 12,000 lpd.
- HASSAN COOP MILK PRODUCERS' SOCIETIES' UNION LTD,** B M Rd, Hassan 573201; Ph: 8738, 8952, Gram: Hamul; Mg Dir: B Ramakrishnegowda; Offr Incharge: Dr H Narayana. Soc: 412, Mems: 56,529. Milk Proc, Oct 86: 56,000 lpd.
- MYSORE COOP MILK PRODUCERS' SOCIETIES UNION LTD,** THE, No 14 Model House, Siddartha Layout, T Narasipura Rd, Mysore 570011; Ph: 25988, Gram: Mymul; Mg Dir: Dr G S Kutniker, Ph (resi): 23376. Soc: 678, Mems: 132,000. Av Milk Proc: 109,000 lpd.
- TUMKUR COOP MILK PRODUCERS' SOCIETIES' UNION LTD,** No 46 K R Extn, B H Rd,

THE NORTH ARCOT DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD.

Arcot Road, Sathuvachari, Vellore 632009
Phones: 22342, 20193 o Gram: AAVIN

OPERATION FLOOD NORTH ARCOT DISTRICT, TAMIL NADU

Achievements:

No. of Dairy Cooperative Societies organised	...	838
No. of Farmers benefited		1,24,096
No. of Societies covered under		
Animal Health Cover		396
No. of Societies covered under A.I. Cover		333
No. of Artificial Insemination done so far		3,41,148
No. of Calves born so far		1,14,025
Daily Milk Procurement		1,85,000 lpd
Daily Milk Output to Mother Dairy (Madras)		1,75,000 lpd
Daily Local Sales		10,000 lpd

The Standardised (Pasteurised) Milk at 4.5% Fat and 8.5% SNF is being distributed to the towns, like Vellore, Ranipet, Gudiyatham and Arakonam in this District.

**OUR GOAL IS TO SUBSERVE MORE MILK PRODUCER
FARMERS AND CONSUMERS IN THE DISTRICT.**

DR J. GOVINDARAJ, B.V. Sc.
Managing Director

Thiru C. Gopal, B. Sc, B.L., Ex-M.L.A.
Chairman

Tumkur 572101; Ph: 8176; Mg Dir: Dr S Dayananda, Ph: 8176, resi: 8479; Offr Incharge: Dr G S Jayaprakash Reddy, Ph: 8178, resi: 8944; Trg Coordinator: Dr S T Tayappa, Ph (resi): 2244. Soc: 494, Mems: 83,000. Av Milk Proc: 69,000 lpd.

Kerala



CALICUT COOP MILK SUPPLY UNION LTD, THE, Calicut Central Dairy, PO Beypore North, Calicut 673015; Ph: 8717, Gram: Copmilk; Pres: P P Gopinatha Pillai; Sec: M P Sreenivasan, Ph (resi): 8847. Branch: City Office, Kallai Rd, Calicut 673002; Ph: 72469. Soc: 51. Milk Proc, Nov 85: 19,297 lpd, Apr 86: 15,434 lpd.

ERNAKULAM REGIONAL COOP MILK PRODUCERS' UNION LTD, Padivattom, Edappally, Cochin 682024; Ph: 4822; Chmn: P Sreedhara Menon; Mg Dir: P K Narendranathan, Ph (resi): 6725; Mgr (P&I): C V Thomas, Ph (resi): 5166. Soc: 262, Mems: 51,000. Av Milk Proc: 49,000 lpd.

TRICHUR COOP MILK SUPPLY UNION LTD, 3280 M G Rd, Trichur 680004; Ph: 21316, 20154, 23221; Chmn: A S N Nambeesan; Sec: V Sadanandah.

TRIVANDRUM REGIONAL COOP MILK PRODUCERS' UNION LTD, 'Girijabhavan', Thycad, Trivandrum 695014; Ph: 68514, 68736; Chmn: Attukal Sundaram; Mg Dir: K P Padmanabha Kurup, Ph (resi): 75723; Mgr (P&I): K Gopakumaran Nair, Ph (resi): 65290. Branch Offices: Adoor, Mavelikkara, Quilon. Soc: 249, Mems: 38,471. Milk Proc, June 86: 66,000 lpd.

Madhya Pradesh

BHOPAL DUGDHA SANGH SAHAKARI MARYADIT, Bhopal Dairy Plant, Habibganj, Bhopal 462024; Ph: 63035, 65724, Tlx: 0705-237; Mg Dir: H K Gosain, Ph off: 63517, fac: 64044, resi: 64794; Mgr (Plant

Ops): N K Jairath; Mgr (Field Ops): A P Sharma. Soc: 371, Mems: 25,605. Milk Proc, Nov 85: 34,200 lpd, Apr 86: 20,600 lpd.

GWALIOR DUGDH SANGH (SAHAKARI) MARYADIT, Gola-Ka-Mandir, Morar, Gwalior; Mg Dir: C P Arora; Mgr (Plant Ops): R C Bhargava. Soc: 127, Mems: 7,000. Av Milk Proc: 14,000 lpd.

INDORE DUGDH SANGH (SAHAKARI) MARYADIT, Chanda Talawali Mangliya, Indore 453771; Ph: 38781, Gram: Dudhsangh, Tlx: 0735-233; Mg Dir: G R Sharma; Mgr (Plant Ops): S K Verma. Mems: 30,000. Av Milk Proc: 64,000 lpd.

JABALPUR DUGDH SANGH (SAHAKARI) MARYADIT, E-1 Dairy Colony, Adhartal, Jabalpur; Mg Dir: Sudhir Kapur. Av Milk Proc: 9,000 lpd.

RAIPUR DUGDH SANGH (SAHAKARI) MARYADIT, PO Krishik Nagar, Arang Rd, Raipur 492012; Ph: 23208, Tlx: 0755-207; Mg Dir: A R Kulkarni, Ph (resi): 27539. Soc: 186, Mems: 5,814. Av Milk Proc: 5,500 lpd.

SAGAR DUGDH SANGH (SAHAKARI) MARYADIT, 7 Civil Lines, Sagar 470001; Ph: 3178, 2669, Gram: Dugdhnigam; Mg Dir: Dr U B Kekre; Asst Mgr (QC): M K Rastogi; Asst Mgr (AH): Dr E C Shekhar; Asst Mgr (FP): Jamadar Singh. Branches: Bijawar, Jatara. Soc: 75, Mems: 2,000. Av Milk Proc: 2,000 lpd.

UJJAIN DUGDH SANGH (SAHAKARI) MARYADIT, Maxi Rd, Ujjain 456001; Ph: 4615, Gram: Dugdhsangh, Tlx: 733-204 UDS IN; Mg Dir: R K Kulkarni, Ph (resi): 4815; Mgr, Plant Operation: A K Dubey, Ph: 4857. Soc: 474, Mems: 26,000. Av Milk Proc: 77,000 lpd.

Maharashtra

AHMEDNAGAR DIST COOP MILK PRODUCERS' UNION LTD, Savedi Rd, Ahmednagar; Acctts & Admn Offr: N T Gonte. Soc: 90, Mems: 35,000. Av Milk Proc: 368,000 lpd.

AKOLA DIST MILK PRODUCERS' COOP UNION LTD, Akola; Chmn: Rangrao Bapu Deshmukh.

AMRAVATI DIST MILK PRODUCERS' COOP UNION LTD, Avinash Colony, Congress Nagar Rd, Amravati; Mgr: V S Gawade.

AURANGABAD DIST COOP MILK PRODUCERS' UNION LTD, Govt Milk Scheme Compound, Jalna Rd, Aurangabad 431001; Ph: 4278, Gram: Amrit; Chmn: Namdeorao S Patil; Mg Dir: C N Yadav; Fodder Dev Offr: P B Arvikar; Vet Offrs: Dr D G Mhaisekar, Dr A R Bhadekar; AI Offr: Dr V G Phalak. Soc: 99, Mems: 8,000. Av Milk Proc: 34,000 lpd.

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Post Box No. 32, Jalgaon 425 001

Dist. Jalgaon (Maharashtra)

Phones: 6645, 6646, 6647, 6648, 6649, 5611, 4030 • Gram: DUDHVIKAS

Jalgaon Jilha Sahakari Dudh Utpadak Sangh Ltd., a cooperative venture in Maharashtra State, was launched in 1971. Its feeder balancing dairy (capacity: 2 lakh litres per day) supplies pasteurised milk to Bombay metropolis and other towns of Jalgaon District and manufactures milk products like Vikas Ghee, Vikas Butter, Vikas Powder, Shrikhand and Pedha. The annual turnover of the project is Rs. 25 crores.

It has undertaken integrated input programme like mobile veterinary services, artificial insemination programme, cattle feed manufacturing and distributing, fodder development programme, etc. The primary milk collection centres are organised on Anand Pattern. The project is financed by Indian Dairy Corporation, under Operation Flood I and II programme and is executed by the National Dairy Development Board, Anand.

DR. D.K. TOKE
Managing Director

P. V. PATIL
Chairman

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Calicut 673015
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Phones:

Head Office: 8717 • City Office: 72469 • Secretary (Resi): 8847

P.P. GOPINATHA PILLAI
President

M.P. SREENIVASAN
Secretary

BEED DIST CENTRAL COOP MILK PRODUCERS' AND SUPPLIERS UNION LTD, Ashok Nagar, Barshi Naka, Beed 431122; Chmn: Rajendra Jagtap; Mg Dir: V D Kulkarni. Soc: 107, Mems: 22,000. Av Milk Proc: 47,000 lpd.

BHANDARA DIST COOP MILK PRODUCERS' UNION LTD, PB No 27, Bhandara 441904; Mg Dir: V C Sabjiwale. Mems: 16,000. Av Milk Proc: 42,000 lpd.

BULDANA JILLHA DUDH UTPADAK SAHKARI SANGH LTD; PB No 9, Popat Bhavan, Chikhali Rd, Buldana 443001; Ph: 277, 294, Gram: Cofedmilk; Chmn: Vithalrao Sonaji Patil; Mg Dir: Dr R M Chaudhari. Soc: 84, Mems: 10,000. Milk Proc, Dec 85: 46,243 lpd, June 86: 30,047 lpd.

CHANDRAPUR DIST MILK PRODUCERS' COOP UNION LTD, Tilak Maidan, Chandrapur 442401; Mg Dir: D T Bhamse. Mems: 10,000. Av Milk Proc: 7,000 lpd.

JALGAON JILHA SAHAKARI DUDH UTPADAK SANGH MARYADIT, PB No 32, Near Erandol Naka, Jalgaon 425001; Ph: 5611, 6645, 6646, 6647, 6648, 6649, Gram: Dudhvikas; Chmn: Premachand Vyankatrao Patil, Ph: 4030; Mg Dir: Dr D K Toke, Ph off: 5611, resi: 3372. Societies: 888, Members: 80,000. Milk Proc, Jan 86: 169,773 lpd, June 86: 116,842 lpd.

KOLHAPUR ZILLA SAHAKARI DUDH UTPADAK SANGH LTD, Kolhapur Gokul Project, Plot No B-1, MIDC, Gokulshirgaon 416234; Ph off: 24308, 24615, Dairy: 27478, Gram: Dudhsangh, Tlx: 0195-253 MILK IN; Chmn: Anandrao D Patil, Ph: 75; Mg Dir: S R Khadye, Ph resi: 23647. Soc: 808, Mems: 138,347. Milk Proc, Nov 85: 161,788 lpd, Apr 86: 124,200 lpd.

KOYANA COOP MILK PRODUCERS UNION LTD, Karad 415110, Dist Satara; Mgr: C T Shete.

NAGPUR DIST COOP MILK PRODUCERS' UNION LTD, Nagpur; Chmn: N D Mane.

NANDED DIST COOP MILK PRODUCERS & SUPPLIERS UNION LTD, Nanded; Chmn: Shankarrao Jinke.

NASIK DIST COOP MILK PRODUCERS' UNION LTD, Renuka Nagar, Wadala Naka, Nasik; Chmn: Kisanraoji Chauhanke; Mg Dir: A L Roy. Mems: 23,000. Av Milk Proc: 52,000 lpd.

OSMANABAD (LATUR) ZILLA DUDH UTPADAK & PURVATHA SAHAKARI SANGH MARYADIT, Near Sherkhane Petrol Pump, Osmanabad 413501; Ph: 365, 559, Gram: Cofedmilk; Chmn: Tukaram T Mane; Mg Dir: M S Patil, Ph (resi): 509. Soc: 857, Mems: 39,509. Milk Proc, Dec 85: 69,515 lpd, June 86: 49,211 lpd.

PARBHANI DIST MILK PRODUCERS & SUPPLIERS COOP UNION LTD, MIDC Area, Plot No 19, Parbhani; Chmn: M K Deshmukh.

PUNE ZILLHA SAHAKARI DUDH UTPADAK SANGH MARYADIT, Katraj, Pune-Satara Rd, Pune 411046; Ph: 440697, 442042, 33453, 470058; Chmn: Ashokrao N Mohol, Ph (resi): 35680; Mg Dir: R L Meher, Ph (resi): 58041; Dairy Mgr: M N Patel, Ph (resi): 31237; NDDB Team Leader: R Raychaudhuri. Soc: 768, Mems: 60,000. Milk Proc, Nov 85: 268,348 lpd, Apr 86: 258,065 lpd.

SANGLI DIST COOP MILK PRODUCERS' UNION LTD, Market Yard, Miraj 416410; Mg Dir: O P Sinha. Soc: 51, Mems: 13,000. Av Milk Proc: 132,000 lpd.

SATARA SAHAKARI DUDH PURAVATHA SANGH LTD, Shivaji Circle, Satara 415001; Ph: 2770; Mgr: S K Jadhav. Av Milk Proc: 141,000 lpd.

SHIVAMRUT DOCDH UTPADAK SAHAKARI SANGH MARYADIT, Akluj, At Shankarnagar, PO Yeshwantnagar 413118, Tal Malshiras, Dist Sholapur; Ph: 126, 426, Gram: Shivamrut, Akluj; Chmn: Rajsinh Shankarrao Mohite-Patil, Ph (resi): 38, 380; Mgr: B M Ranaware. Soc: 123. Av Milk Proc: 76,000 lpd.

SHREE WARANA SAHAKARI DUDH UTPADAK PRAKRIYA SANGH LTD, Amrutnagar, PO Warananagar 416113, Dist Kolhapur; Ph: 27, 28, 68, 69, Gram: Waranadudh; Chmn: D A Kore; Mg Dir: C N Gulave. Soc: 120, Mems: 5,200.

SHRIRAMPUR DIST MILK PRODUCERS' COOP UNION LTD, Babhaleshwar, Tal Shrirampur; Chmn: Raosaheb Mhaske.

SOLAPUR DIST COOP MILK PRODUCERS' UNION LTD, 24/1A Murarji Peth, Near Nav Bharat Ice Factory, Solapur; Ph: 2268, 7589, Gram: Cofedmilk; Chmn: Bhagwan Sakharam Chavan; Mgr: Shivram D Papal. Soc: 235, Mems: 23,000. Av Milk Proc: 30,000 lpd.

WARDHA DIST COOP MILK PRODUCERS' UNION LTD, Wardha. Soc: 3, Mems: 10,000. Av Milk Proc: 42,000 lpd.

YAVATMAL DIST COOP MILK FEDERATION LTD, Civil Lines, Yavatmal 445001; Ph: 2920, Gram: Cofedmilk; Chmn: S N Mankar; Mg Dir: S W Rathod, Ph (resi): 2918. Soc: 451, Mems: 18,000. Av Milk Proc: 14,000 lpd.

Mizoram

MIZORAM COOP MILK PRODUCERS' UNION LTD, c/o Dte of AH & Vet, Govt of Mizoram, Aizawl 796001; Ph: 451; Mg Dir: Dr R Kapthuama; Mgr: Dr Daniel Chainghnuna. Soc: 23.

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D. A. KORE
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COIMBATORE 641 002

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M. JESUSAVARINATHAN
Managing Director

M. NATARAJAN
Chairman

Orissa

- CUTTACK DIST COOP MILK PRODUCERS' UNION LTD,
Soro House, Nayabazar, Cuttack 753004; Ph:
25447; Gen Mgr: Dr S R Pattanaik.
- DHENKANAL DIST COOP MILK PRODUCERS' UNION
LTD, Kunjakanta, Dhenkanal 759001; Ph:
153; Gen Mgr: F R Sagar. Soc: 83, Mems:
3,000. Av Milk Proc: 2,000 lpd.
- GANJAM DIST MILK PRODUCERS' COOP UNION LTD,
R N Temple Rd, Berhampur 760001; Ph:
2765; Gen Mgr: G S Das.
- KEONJHAR DIST COOP MILK PRODUCERS' UNION
LTD, Silisuan Milk Chilling Plant Cam-
pus, PO Raisuan 758013; Ph: 340; Chmn:
J K Mohapatra, Ph: 1; Gen Mgr: Dr S C
Sahu, Ph: 285. Soc: 53, Mems: 1,964.
Av Milk Proc: 2,000 lpd.
- PURI DIST COOP MILK PRODUCERS' UNION LTD,
Lewis Rd, Bhubaneswar 751002; Ph: 56624;
Gen Mgr: Dr R N Pattnayak, Ph (resi):
56479; Chilling Centres: (i) Nayagarh;
Ph: 122; Asst Mgr: Dr B C Swain; (ii)
Nimapara; Ph: 92; Vet Offr: Dr K K
Pattnayak. Soc: 88, Mems: 5,000. Milk
Proc, Nov 85: 1,950 lpd, Apr 86: 4,018 lpd.
- SAMBALPUR DIST COOP MILK PRODUCERS' UNION
LTD, At & PO Sambalpur 768001; Chmn: U S
Bhatia, IAS, Ph: 985; Gen Mgr: Dr M Pra-
dhan. Soc: 12, Mems: 1,500. Milk Proc,
Jan 86: 3,200 lpd, June 86: 3,000 lpd.

Pondicherry

- PONDICHERY COOP MILK PRODUCERS' UNION LTD,
33 Mission St, Pondicherry 605001; Ph:
4505, Gram: Comilk; Chmn: T Kaliaperu-
mal; Mg Dir: K Parasuraman, Ph off: 5750,
resi: 5901; Sr Mgr (P&I): Dr A N Partha-
sathy, Ph: 4505. Soc: 62, Mems: 12,000.
Av Milk Proc: 16,000 lpd.

Punjab

- AMRITSAR DIST COOP MILK PRODUCERS' UNION
LTD, Milk Plant, Batala Rd, PB No 29,
Verka, Amritsar 143001; Ph: 33944,
44972, Gram: Milkamritsar, Tlx: 0384-

213 MILK IN; Mg Dir: K K Bali, Ph off:
52955, 46960, resi: 42297. Soc: 431,
Mems: 22,304. Milk Proc, Nov 85: 44,139
lpd, Apr 86: 71,120 lpd.

- DOABA COOP MILK PRODUCERS' UNION LTD, G T
Rd Bye-Pass, Jalandhar 144008; Ph: 74730,
73546, Gram: Coopmilk; Mg Dir: Amrik
Singh, Ph (resi): 75650. Soc: 566, Mems:
30,249. Milk Proc, March 86: 125,393 lpd.
- FARIDKOT DIST COOP MILK PRODUCERS' UNION
LTD, Milkfed Milk Plant, Opp Canal Col-
ony, Ferozepur Rd, Faridkot. Soc: 335,
Mems: 17,000. Av Milk Proc: 27,000 lpd.
- FEROZEPUR DIST COOP MILK PRODUCERS' UNION
LTD, Ferozepur; Ph: 2449. Soc: 256,
Mems: 13,000. Av Milk Proc: 23,000 lpd.
- GURDASPUR DIST COOP MILK PRODUCERS' UNION
LTD, Opp ITI, Pathankot Rd, PB No 5,
Gurdaspur 143521; Ph: 787; Mg Dir:
Dr Nirban Singh, Ph (resi): 752. Soc:
281, Mems: 11,211. Milk Proc, Nov 85:
18,467 lpd, Apr 86: 36,747 lpd.
- GURU COOP MILK PRODUCERS' UNION LTD, Dab-
wali Rd, Bathinda 151001; Ph: 2679, 2825,
2806; Mg Dir: S S Bagga, Ph (resi): 3353.
Soc: 351, Mems: 32,336. Milk Proc, Jan
86: 1,179,083 kg, June 86: 202,092 kg.
- HOSHIARPUR DIST COOP MILK PRODUCERS' UNION
LTD, PB No 17, Hoshiarpur 146001; Ph:
2822, 3157, 3493, Gram: Milkfed; Chmn:
Thakur Hardev Chand; Mg Dir: B M L Garg;
Mgr, Milk Proc: S K Mahajan. Soc: 390,
Mems: 24,020. Milk Proc, Jan 86: 37,652
lpd, May 86: 24,986 lpd.
- LUDHIANA DIST COOP MILK PRODUCERS' UNION
LTD, Milkfed Milk Plant, Jagraon Rd,
Ludhiana 141004; Ph: 23056, 26707, 29054;
Mg Dir: Jaswant Singh. Soc: 450, Mems:
30,750. Milk Proc, Apr 86: 101,263 lpd.
- MALWA COOP MILK PRODUCERS' UNION LTD, Sang-
rur 148001; Ph: 2358, Gram: Coopmilk; Mg
Dir: Surjit Singh Bhullar, Ph (resi):
2376; Mgr (Proc): A P Mehta; Mgr (Engg):
K S Dandiwal; Mgr (Prod): A C Sharma.
Soc: 276, Mems: 17,432. Milk Proc, Nov
85: 31,573 lpd, Apr 86: 26,415 lpd.
- PATIALA DIST COOP MILK PRODUCERS' UNION LTD,
Sirhind Rd, PB No 90, Patiala 147001; Ph:
75703; Mg Dir: Capt H S Oberoi, Ph (resi):
76178. Soc: 249, Mems: 10,000. Av Milk
Proc: 46,000 lpd.
- ROPAR DIST COOP MILK PRODUCERS' UNION LTD,
Milk Plant, SAS Nagar, Ropar; Ph: 87782.
Soc: 364, Mems: 15,000. Av Milk Proc:
40,000 lpd.

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- AJMER ZILLA DUGDH UTPADAK SAHAKARI SANGH LTD**, Tabiji Farm, Beawar Rd, Ajmer; Ph: 2319; Mgr: Dr L B L Mathur. Soc: 272, Mems: 18,729. Milk Proc, Nov 85: 54,675 lpd, Apr 86: 57,826 lpd.
- ALWAR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Dugdh Bhawan, Near Circuit House, Alwar 301001; Ph: 21252, 21168, Gram: Dugdh; Mg Dir: Dr S N Dhawan, Ph (resi): 21172; Proj Offr (FO): O P Chaudhry; Proj Offr (SAHP): Dr A L Mathur; Proj Offr (Input): Dr H N Govil; Proj Offr (Trg): R D Kaushik; Acctts Offr: M L Gupta; Statistician: Anil Kumar. Soc: 450, Mems: 34,196. Milk Proc, Dec 85: 70,550 lpd, June 86: 50,032 lpd.
- BANASWARA ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Banaswara; Mgr: Dr P D Mathur. Soc: 65, Mems: 2,000. Av Milk Proc: 1,000 lpd.
- BHARATPUR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Bharatpur; Proj Offr: O P Chowdhry. Soc: 184, Mems: 6,000. Av Milk Proc: 17,000 lpd.
- BHILWARA ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, 5-Km Ajmer Rd, Bhilwara 311001; Ph: 6504, 6729; Chmn: S P Mansinghka, Ph: 6215, 6779; Mg Dir: Dr V B Ghate, Ph (resi): 6686. Soc: 320, Mems: 17,000. Milk Proc, Nov 85: 46,000 lpd, Apr 86: 59,000 lpd.
- CHURU ZILA SAHAKARI DUGDH UTPADAK SANGH LTD**, Gandhi Vidya Mandir, Bikaner Rd, Sardar-Shahr, Churu 332401; Ph: 192; Mg Dir: Dr A C Mathur. Soc: 110, Mems: 6,992. Milk Proc, Nov 85: 27,656 lpd, Apr 86: 43,573 lpd.
- GANGANAGAR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Hanumangarh; Mgr: Dr N R Saraswar. Soc: 189, Mems: 5,000. Av Milk Proc: 18,000 lpd.
- JAIPUR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Near Gandhi Nagar Railway Station, Jaipur 302017; Ph: 62877, 72049, 68782; Mg Dir: Dr M L Gupta, Ph (resi): 47968; Proj Offr (Trg): Dr O P Sharma; Proj Offr (Tech Input): Dr Himmat Singh; Proj Offrs(FO): A K Mathur, Dr S P Mathur; Proj Offr (SAHP): Dr D K Pandya; Proj Offr (Progeny Testing): Dr S K Kaul. Branches: Choumu, Dausa, Dudu, Kotputali, Phagi. Soc: 431, Mems: 36,000. Milk Proc, Dec 85: 90,102 lpd, June 86: 24,517 lpd.

- JALORE ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Bhinmal; Mgr: Dr A S Jodha. Soc: 45, Mems: 1,000. Av Milk Proc: 9,000 lpd.
- KOTA ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Kota 324009; Ph: 25146; Mg Dir: Dr M C Sharma, Ph (resi): 23019. Soc: 78, Mems: 3,000. Milk Proc, Nov 85: 12,227 lpd, Apr 86: 9,291 lpd.
- PALI ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Patel Nagar, Pali, Marwar; Ph: 7575; Mg Dir: Dr G N Joshi. Soc: 130, Mems: 5,000. Av Milk Proc: 38,000 lpd.
- PASCHIMI RAJASTHAN DUGDH UTPADAK SAHAKARI SANGH LTD**, 35 Heavy Indl Area, Jodhpur; Ph: 22815; Mg Dir: Dr M M Mehta, Ph (resi): 21757; Proj Offr (FO): Dr R S Rathore; Proj Offr (Input): Dr D N Vyas; Proj Offr (Trg): Dr A L Trivedi; Proj Offr, Balotra: Dr L D Purohit; Proj Offr, Nagour: Dr G D Purohit; Proj Offr, Pokharan: Dr S P Mathur. Soc: 604, Mems: 39,412. Milk Proc, Nov 85: 60,552 lpd, Apr 86: 81,706 lpd.
- SAWAI MADHOPUR AND TONK ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Kamdhenu Bhawan, Ranthambhore Rd, Sawai Madhopur; Ph: 233; Mg Dir: Dr B P Joshi. Branches: Ganganpurcity, Malpura. Soc: 143, Mems: 10,330. Milk Proc, March 86: 19,696 lpd.
- SIKAR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Sikar; Mgr: S K Kashliwal. Soc: 70, Mems: 1,000. Av Milk Proc: 3,000 lpd.
- UDAIPUR ZILA DUGDH UTPADAK SAHAKARI SANGH LTD**, Goverdhan Vilas, Ahmedabad Rd, Udaipur 303001; Ph: 27029; Chmn: R K Khurana, Ph: 26715; Mgr: Dr P L Mathur, Ph (resi): 23028. Soc: 115, Mems: 7716. Milk Proc, Nov 85: 19,171 lpd, Apr 86: 11,530 lpd.
- UTTARI RAJASTHAN DUGDHA UTPADAK SAHAKARI SANGH LTD**, Urmul Bhawan, PB No 55, Bikaner 334001; Ph: 5094; Mg Dir: Dr D N Singh. Soc: 574, Mems: 32,000. Av Milk Proc: 170,000 lpd.

Sikkim

- SIKKIM COOP MILK PRODUCERS' UNION LTD**, Gangtok. Soc: 112, Mems: 3,000. Av Milk Proc: 3,000 lpd.

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**PROGRESSIVELY STEPPING TOWARDS WHITE REVOLUTION
IN FAIZABAD DISTRICT DURING 1984-88**

- Increase in milk producers' cooperative societies from 60 to 188 on Anand Pattern.
- Enhancement of good quality milk production from 3,000 litres to 10,000 litres per day.
- Coverage of milk producers as members of Primary Milk Societies increased to 7,000 of which at least 30% are from the weaker section.
- Quality based weekly price of milk paid to the producers by their societies.
- Facility to provide technical inputs, i.e. prevention of diseases, veterinary facilities, artificial insemination and balanced Parag Cattle Feed, etc at producers level.
- Pure, natural and high quality of Parag liquid milk and its products on reasonable rates in morning and evening for city consumers.
- Proper training and technical guidance to the producers and workers of the societies and dairy regarding Dairy's activities and cooperative movement.

SAKET DAIRY
PRADESHIK COOPERATIVE DAIRY FEDERATION LTD.
Ayodhya Road, Faizabad 224123
Phone: 2765 • Gram: DAIRYFED

Tamil Nadu

COIMBATORE DIST COOP MILK PRODUCERS' UNION LTD, THE, West Sambandam Rd, R S Puram, Coimbatore 641002; Ph: 22389, 35016, Gram: Cocomilk; Chmn: M Natarajan, Ph (resi): 32389; Mg Dir: M Jesusavari-nathan, Ph (resi): 31022. Chilling Centres: Shanmughapuram, Sultanpet, Tiruppur. Selling Centres: Mettupalayam, Pollachi, Udumalpet. Soc: 390, Mems: 50,405. Milk Proc, Nov 85: 49,709 lpd, Apr 86: 60,698 lpd.

DHARMAPURI DIST COOP MILK PRODUCERS' UNION LTD, Kanakamuttlu, Krishnagiri 635002; Ph: 437 & 487; Chmn: S A Ranganathan; Mg Dir: Dr R Solomon, Ph (resi): 448; Mgr (Prod): S Marudhachalam, Ph: 98. Soc: 533, Mems: 76,656. Milk Proc, June 86: 62,637 lpd.

DINDIGUL COOP MILK SUPPLY UNION LTD, East Govindapuram, Dindiguri 624001; Ph: 4516; Spl Offr: C Chinnaamy; Sec: K Md Abdul Kadir.

KAMARAJAR DIST COOP MILK PRODUCERS' UNION LTD, 2/1 A Kasthurbai Rd, Virudhunagar; Ph: 4894; Mg Dir: Srinivasan.

KANYAKUMARI DIST COOP MILK PRODUCERS' UNION LTD, THE, Kottar-Parvathipuram Rd, Nagercoil 629003; Ph: 3356, Gram: Kanyamilk, Tlx: 446-212 PCO IN; Chmn: A Selvinkumar, Ph (resi): 5587; Mg Dir: A Ponniah Ranganathan, Ph (resi): 4375. Branch: Marthandam. Soc: 99. Milk Proc, Nov 85: 13,404 lpd, Apr 86: 14,458 lpd.

MADRAS CHINGLEPUT DIST COOP MILK PRODUCERS' UNION LTD, No 23 Guruvappa Maistry St, Ayyanavaram, Madras 600023; Ph: 615407; Mg Dir: S Sankaran; Gen Mgr: K R Narayanaswamy, Ph (resi): 665377. Soc: 594, Mems: 35,000. Av Milk Proc: 32,000 lpd.

MADURAI DIST COOP MILK PRODUCERS' UNION LTD, THE, Sathamangalam, PB No 11, Madurai 625020; Ph: 24964, Gram: Aavin, Tlx: 0445-210; Mg Dir: S Ramasubbaiah, Ph (resi): 42893; Mgr (Plant): V Rathinam; Mgr (Production): S Dharmaraj. Soc: 794, Mems: 138,000. Av Milk Proc: 72,000 lpd.

NILGIRIS DIST COOP MILK PRODUCERS' UNION LTD, Coonoor Rd, Udhamandalam 643001 (Ooty); Ph: 2559, 3259, Gram: Coopmilk; Chmn: A Md Azam; Mg Dir: Dr K Ambalavanan, Ph off: 3428, resi: 2749. Soc: 120, Mems: 25,864. Milk Proc, Nov 85: 28,942 lpd, Apr 86: 15,665 lpd.

NORTH ARCOT DIST COOP MILK PRODUCERS' UNION LTD, THE, Arcot Rd, Sathuvachari, Vellore 632009; Ph: 22342, Dairy: 21061; Chmn: C Gopal, Ph (resi): 81 (Sholingar); Mg Dir: Dr J Govindaraj, Ph (resi): 22292; Mgr (P&I): Dr N Velayudham, Ph (resi): 21227. Marketing Off: 21/2 Veppamara St, Velapadi, Vellore 632001; Ph: 20193. Chilling Centres: Ambur (Ph: 2505), Anakkavur (Ph: 2), Tiruvannamalai (Ph: 2673). Soc: 829, Mems: 114,273. Milk Proc, Jan 86: 141,593 lpd, Oct 86: 167,562 lpd.

PERIYAR DIST COOP MILK PRODUCERS' UNION LTD, THE, Vasavi College Post, Erode 638316; Ph: 75205, 75206, Gram: Perimilk, Tlx: 0856-203; Gen Mgr: P Sonai, Ph (resi): 72040. Soc: 553, Mems: 82,114. Milk Proc, March 86: 160,813 lpd.

PUDUKOTTAI DIST COOP MILK PRODUCERS' UNION LTD, Kalyanaramapuram 1st St, Pudukottai 622002; Ph: 2587; Mg Dir: Dr P Subramanian. Soc: 13, Mems: 6,000. Av Milk Proc: 2,000 lpd.

RAMNAD & PASUMPON MUTHURAMALINGAM DIST COOP MILK PRODUCERS UNION LTD, Karaikudi 623002; Ph: 2918; Mg Dir: V Subramaniampillai.

SALEM DIST COOP MILK PRODUCERS' UNION LTD, Sithanur, Dhalavaipatty, Jagir Ammapalayam Post, Salem 636302; Ph: 7082, 7003, 7892, 7574, Gram: Milk; Mg Dir: Dr T Ramamoorthy, Ph (resi): 66215. Soc: 639, Mems: 119,000. Milk Proc, March 86: 182,246 lpd.

SOUTH ARCOT DIST COOP MILK PRODUCERS' UNION LTD, Valuddareddy Post, Arcot Rd, Villupuram 605602; Ph: 2766; Mg Dir: S Venkatachalam, Ph (resi): 2086. Soc: 453, Mems: 63,000. Av Milk Proc: 57,000 lpd.

TANJORE DIST COOP MILK PRODUCERS' UNION LTD, Vanjikottai Rd, Tanjore 613006; Ph: 152; Mg Dir: A Ramaiah, IAS, Ph (resi): 863.

TIRUCHIRAPALLI DIST COOP MILK PRODUCERS' UNION LTD, Thanjavur Rd, Tiruchy 620008; Ph: 24964, 32619; Chmn: Pon Kaliyaperumal, Ph: 28801; Mg Dir: Dr A Karpagha Vinayagam, Ph: 31136, resi: 29814; Mgr (P&I): Dr K Sheik Ahamed Basha; Dep Mgr (P&I): Dr A Balasubramanian, Ph (resi): 84503. Soc: 303, Mems: 69,630. Av Milk Proc: 43,000 lpd.

TIRUNELVELI DIST COOP MILK PRODUCERS UNION LTD, THE, Reddiarpatti Rd, Tirunelveli 627007; Ph: 6002, 5536, Gram: Nellai Milk; Chmn: Tmt Kamala Senthilkumar; Mg Dir: Dr M Reginold. Soc: 289, Mems: 11,585. Milk Proc, Jan 86: 36,041 lpd.

Tripura

TRIPURA COOP MILK PRODUCERS' UNION LTD,
THE, Agartala Dairy, Indranagar, Agar-
tala 799006; Ph: 3524, 3801; Mg Dir:
J L Kar; Gen Mgr: M L Chakraborty. Soc:
75, Mems: 4,000. Av Milk Proc: 5,000 lpd.

Uttar Pradesh

AGRA DUGDH UTPADAK SAHAKARI SANGH LTD,
Bundu Katra, Gwalior Rd, Agra 282001;
Ph: 63071, 65413; Gen Mgr: V B Saxena.
Soc: 141, Mems: 6,000. Av Milk Proc:
10,000 lpd.

ALIGARH DUGDH UTPADAK SAHAKARI SANGH LTD,
Ram Ghat Rd, Aligarh; Mgr: Anil Kumar.
Soc: 69, Mems: 4,000. Av Milk Proc:
34,000 lpd.

ALLAHABAD SAHAKARI MILK BOARD LTD, 165 Bai
Ka Bagh, Allahabad 211003; Ph: 55480,
Gram: Paragmilk; Gen Mgr: J P Shukla;
Mgr (Prod): N K P Singh. Soc: 185, Mems:
7,539. Av Milk Proc: 10,000 lpd.

ALMORA DUGDH UTPADAK SAHAKARI SANGH LTD,
Patal Devi, Almora; Mgr: A K Singh.
Soc: 19, Mems: 1,303. Milk Proc, Dec
85: 47 lpd, June 86: 205 lpd.

AZAMGARH DUGDH UTPADAK SAHAKARI SANGH LTD,
Azamgarh.

BALLIA DUGDH UTPADAK SAHAKARI SANGH LTD,
Mahadev Niwas, Tikhampur, Ballia; Mgr:
Y Kumar. Soc: 131, Mems: 21,000. Av Milk
Proc: 5,000 lpd.

BARABANKI DUGDH UTPADAK SAHAKARI SANGH LTD,
Giyar Miya Ki Kothi, Naka Paisat, Bara-
banki; Mgr: V K Singh. Soc: 267, Mems:
16,000. Av Milk Proc: 13,000 lpd.

BAREILLY DUGDH UTPADAK SAHAKARI SANGH LTD,
PO Kareely, Bareilly; Ph: 75876; Pres:
Budh Sen; Dairy Mgr: A K Gupta, Ph
(resi): 74933.

BIJNORE DUGDH UTPADAK SAHAKARI SANGH LTD,
Bijanore.

BULANDSHAHR DUGDH UTPADAK SAHAKARI SANGH
LTD, Bulandshahr Bhoor, Bulandshahr;
Gen Mgr: N D Kiradoo. Soc: 254, Mems:
13,000. Av Milk Proc: 44,000 lpd.

DEHRADUN DUGDH UTPADAK SAHAKARI SANGH LTD,
Raipur Rd, Dehra Dun 248001; Ph: 24748;
Mgr: B P Gupta. Soc: 39, Mems: 1,680.
Milk Proc, Nov 85: 550 lpd, Apr 86: 600 lpd.

ETAH DUGDH UTPADAK SAHAKARI SANGH LTD,
Shanti Nikunj, 6 Shingar Nagar, Etah;
Mgr: Jaipal Singh. Soc: 19, Mems:
1,000. Av Milk Proc: 1,000 lpd.

ETAWAH MILK PRODUCERS' COOP UNION LTD, 52-C
Civil Lines, Etawah; Ph: 434, Gram: Milk-
union; Mgr: K P Sharma, Ph (resi): 708.
Soc: 118, Mems: 4,981. Milk Proc, Nov 85:
5,742 lpd, May 86: 3,300 lpd.

FARRUKHABAD DUGDH UTPADAK SAHAKARI SANGH
LTD, 268 Kha, Near Bholapur PO, Farrukha-
bad; Mgr: S R Malik. Soc: 16, Mems: 1,000.
Av Milk Proc: 2,000 lpd.

FATEHPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
House No 6, Shekhar Sadan, Civil Lines,
Fatehpur; Mgr: M L Pathak. Soc: 214,
Mems: 11,000. Av Milk Proc: 17,000 lpd.

GHAZIABAD DUGDH UTPADAK SAHAKARI SANGH LTD,
Kishanganj, Hapur; Gen Mgr: K K Agrawal.
Soc: 232, Mems: 12,000. Av Milk Proc:
22,000 lpd.

GHAZIPUR DIST COOP MILK PRODUCERS' UNION
LTD, c/o Singh Cold Storage, Azamgarh
Rd, Ghazipur; Mgr: A J Singh. Soc: 32,
Mems: 1,000. Av Milk Proc: 1,000 lpd.

GORAKHPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
PO Haraia, Gola Rd, Gorakhpur; Ph: 4045.

HARDOI DUGDH UTPADAK SAHAKARI SANGH LTD,
Sitapur Rd, Hardoi; Mgr: A N Singh. Soc:
33, Mems: 2,000. Av Milk Proc: 4,000 lpd.

JALAUN DUGDH UTPADAK SAHAKARI SANGH LTD,
Orai, Jalaun.

JAUNPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
Aliganj Govt Colony, PO Kalichabad, Jaun-
pur 222603; Mgr: C B Singh; Mgr (P & I):
Dr V P Jaiswal. Soc: 13, Mems: 520. Av
Milk Proc: 1,000 lpd.

KANPUR SAHAKARI MILK BOARD LTD, Nirala
Nagar, Juhi, Kanpur; Ph: 71981, 71991;
Gen Mgr: G P Mathur. Soc: 85, Mems:
5,000. Av Milk Proc: 6,000 lpd.

KOTDWARA DUGDH UTPADAK SAHAKARI SANGH LTD,
Kotdwara 246149.

LAL KUAN DUGDH UTPADAK SAHAKARI SANGH LTD,
Nainital.

LUCKNOW PRODUCERS' COOP MILK UNION LTD, Jop-
ling Rd, Lucknow; Ph: 42102, 31588, Gram:
Comilk; Gen Mgr: R C Pandey. Soc: 98,
Mems: 4,867. Milk Proc, Dec 85: 4,138 lpd,
June 86: 2,729 lpd.

MAINPURI DUGDH UTPADAK SAHAKARI SANGH LTD,
590/5 Nai Basti, Shikohabad, Mainpuri;
Mgr: U V S Kushwaha. Soc: 17, Mems: 1,000.
Av Milk Proc: 1,000 lpd.

MATHURA DUGDH UTPADAK SAHAKARI SANGH LTD,
Delhi-Bye Pass, Mathura 281001; Ph: 5158;
Chmn: R R Ram, Ph: 3200; Mgr: Dr M D Gaur.
Soc: 92, Mems: 5,200. Milk Proc, Nov 85:

8,431 lpd, Apr 86: 5,000 lpd.

MEERUT DIST COOP MILK PRODUCERS' UNION LTD,
Meerut. Soc: 539, Mems: 38,000. Av Milk
Proc: 71,000 lpd.

MIRZAPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
Near Jahanvi Hotel, PO Putlighat, Mirza-
pur; Mgr: Dr Ashok Sharma. Soc: 98, Mems:
3,000. Av Milk Proc: 1,000 lpd.

MORADABAD DIST COOP MILK PRODUCERS' UNION
LTD, Moradabad. Soc: 276, Mems: 20,000.
Av Milk Proc: 44,000 lpd.

MUZAFFARNAGAR DUGDH UTPADAK SAHAKARI SANGH
LTD, 662 South Civil Lines, Muzaffar-
nagar; Mgr: S C Gupta. Soc: 156, Mems:
10,000. Av Milk Proc: 17,000 lpd.

PITHORAGARH ZILA DUGDH UTPADAK SAHAKARI
SANGH LTD, Near Dharmashala Lane,
Pithoragarh 262501; Gram: Dugdhsangh.

PRATAPGARH DUGDH UTPADAK SAHAKARI SANGH LTD,
Pratapgarh.

RAE BAREILY DUGDH UTPADAK SAHAKARI SANGH LTD,
Kaharo Ka Adda, Near Nehru's Eye Hospital,
Rae Bareli 229001; Mgr: M K Srivastava.
Soc: 151, Mems: 6,000. Av Milk Proc: 4,000 lpd.

SAHARANPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
Urmila Sadan (Near Sun-Shine Public
School), Naveen Nagar, Saharanpur; Mgr:
Dr G L Srivastava. Soc: 87, Mems: 5,000.
Av Milk Proc: 6,000 lpd.

SHAHJAHANPUR DUGDH UTPADAK SAHAKARI SANGH
LTD, Rausar Kothi, Shahjahanpur; Mgr:
Kunwar Bahadur Singh.

SITAPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
Civil Lines, Near State Bank Colony,
Sitapur 261001; Ph: 2673, fac: 2529;
Mgr: U N Awasthi; Mgr (AH): Dr V K
Sachan; Mgr (FO): B K Choudhury. Soc:
17, Mems: 1,000. Av Milk Proc: 1,000 lpd.

SULTANPUR DUGDH UTPADAK SAHAKARI SANGH LTD,
Opp Vet Hospital, Gola Ghat, Sultanpur;
Mgr: R K Chowdhry. Soc: 113, Mems: 4,000.
Av Milk Proc: 1,000 lpd.

UNNAO DUGDH UTPADAK SAHAKARI SANGH LTD, H No
90, Avas Vikas Colony, Chandrashekar
Nagar, Unnao; Mgr: Dr R P S Chauhan. Soc:
22, Mems: 1,000. Av Milk Proc: 1,000 lpd.

VARANASI DUGDH UTPADAK SAHAKARI SANGH LTD,
C-30/26 Maldahiya, Varanasi; Ph fac: 2327
PP, Sales Off: 56078; Sub Off: Feeder
Balancing Dairy, Industrial Area, Ram-
nagar, Varanasi. Soc: 260, Mems: 10,346.
Av Milk Proc: 4,000 lpd.

West Bengal

BHAGIRATHI COOP MILK PRODUCERS' UNION LTD,
44 Krishnath Rd, Berhampore 742101, Dist
Murshidabad; Ph: 898, Gram: Bhagirathi;
Chmn: R N Ghosh; Gen Mgr: Dr S N Mukher-
jee. Soc: 304, Mems: 17,700. Milk Proc,
Jan 86: 270 lpd, June 86: 530 lpd.

DAMODAR COOP MILK PRODUCERS' UNION LTD,
Barabazar, PO Chinsurah 712101, Dist
Hooghly; Chmn: S Sen, IAS; Gen Mgr:
Dr S B Dutta Roy. Soc: 48, Mems:
1,922. Av Milk Proc: 400 lpd.

GOUR COOP MILK PRODUCERS' UNION LTD, Rab-
indra Bhavan, Malda 732101; Ph: 2292,
Gram: Mamul, Malda; Spl Offr: Dinesh
Joardar; Gen Mgr: S Ghosh. Soc: 96,
Mems: 3,214. Av Milk Proc: 1,000 lpd.



HIMUL

HIMALAYAN COOP MILK PRODUCERS' UNION LTD,
THE, Matigara 734428, Dist Darjeeling;
Ph: 22512, 22681 (Siliguri Ex), 2257
(Darjeeling Ex), Gram: Himul, Matigara;
Chmn: G Balagopal; Chief Exec Offr: R
Mutsuddi; Mgr (P & I): Dr S Bhattacharjee;
Mgr (Accts & Est): S Basu. Soc: 334, Mems:
17,096. Milk Proc, Jan 86: 22,400 lpd,
June 86: 22,700 lpd.

KISHAN COOP MILK PRODUCERS' UNION LTD, PO
Ranaghat 741201, Dist Nadia; Ph: 116,
Gram: Kishan Milk; Chmn: P K Pradhan,
IAS; Gen Mgr: S K Das. Soc: 210, Mems:
14,734. Av Milk Proc: 5,000 lpd.

MIDNAPORE COOP MILK PRODUCERS' UNION LTD, THE,
Birajbhawan, Rangamati, Midnapore 721101;
Ph: 388 (Midnapore), 134 (Ghatal), 56
(Satbankura), Gram: Midmilk; Mg Dir (Actg):
A K Pine. Soc: 104, Mems: 4,891. Av Milk
Proc: 3,200 lpd.

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Dairy Farms

Large dairy cattle/buffalo farms reared for milk production, are listed statewide. The herd strength is indicated where available, using the following abbreviations: B: buffaloes; C: cows; H: heifers; HC: heifer calves. The listing is a representative selection of dairy farms/farmers.

Andhra Pradesh

ABDULLA, IBRAHIM BIN, Masqati, 23-3-620 Sul-tanshai, Hyderabad (B: 170).
 ALI KHAN, ROSHAN, 16-4-643 Chanchalguda, Hyderabad; Ph: 45949 (B: 67).
 ASHOK YADAV, R, Kavadiguda, Secunderabad (B: 50).
 BADRUKA, HARI PRASHAD, 8-1-398/399/1 Toli-chowk, Hyderabad; Ph: 31297 (B: 40).
 BALAJI DAIRY FARM, 6/9/111 Arundelpet, Guntur 522002; Ph: 21929.
 BALAKRISHNA, DR GRANDHI, Gandhinagar, PB No 508, Vijayawada 520003 (Strength: 110).
 BANGARURAJU, ALLURU, Dirusu Maruru 534239, Dist West Godavari.
 BHAINSA GOSHALA, Bhainsa, Adilabad Dist (Strength: 25).
 BUCHIAH, VEERAMACHINENI, Congress Office Rd, Vijayawada 520002 (Strength: 120).
 CHAUS, SALAM, 16-7-462 Azampura, Hyderabad (B: 85).
 CHOUDARY, MALLAIAH, 22-1-536 Kattalguda, Noorkhan Bazar, Hyderabad (B: 80).
 DURGA POULTRY, DAIRY & AGRICULTURE FARM, Bapatla 522101, Guntur Dist; Mg Ptnr: N Pitchaiah Chowdery.
 ELLORE GOSAMARKSHNA SAMITHI, Main Bazar, Eluru 534001, West Godavari Dist; Ph: 20318; Sec: P Satyanarayana (C: 26).
 FAQRUDDIN, HAJI MOHD, Murgan Chowk, Hyderabad (Strength: 134).
 GOPALA RAJU, MANTHENA, Pennada, via Bhuvanavaram, West Godavari Dist.
 GOPIKRISHNA DAIRY FARM, Vill Muthayapally, PO Boguda, Bhoopathipur, SO H Ghanapur 502113, Dist Medak; Ph: Sardhana 35; Prop: Dr R Vijaya Reddy (B: 10, C: 7).
 GOSAMRKSHNA SAMITHI, Cantonment Area, Vijayanagar (Strength: 50).

H M M LTD, Industrial Estate, Dowleswaran, Rajahmundry 533124, East Godavari Dist (B: 22, C: 5).
 HAJI MOHD BABU MIYA, 16-6-393 Cuttalguda, Noorkhan Bazar, Hyderabad; Ph: 522645 (B: 250).
 KAMADHENU CATTLE BREEDING & DAIRY FARM, 12 Padmarao Nagar, Secunderabad 500025; Ph: 68046; Ptnr: Smt Snehlata Bhugal Reddy. Farm: Medchal Tq (Strength: 50).
 KHARIM DURGA PRASADA RAO & BROS DAIRY FARM, Kamakoti Nagar, Bhawanipuram, Vijayawada 520012, Krishna Dist; Ph: 65536 (B: 7, C: 32).
 KRISHNA POULTRY & DAIRY FARM, Hanumantawaka, Visakhapatnam 530010; Ph: 63722; Prop: Dr M Venkateswara Rao.
 MAISAIAH, 16-711-371 Musaram Bagh, Hyderabad (B: 96).
 MALLESHA, YERROLLA, Old Boinpally, Secunderabad (B: 85).
 MERAJ DAIRY FARM, Muradnagar, Hyderabad (B: 130).
 MOHEMOOD ALI, 16-7-412/1 Azempura, Hyderabad; Ph: 42317 (B: 185).
 NALGONDA CATTLE BREEDERS ASSOCIATION, Suryapet, Nalgonda Dist; Convenor: P Ravindranath.
 NIZAMABAD GOSHALA COMMITTEE, Gandhi Gunj, Nizamabad 503001 (Strength: 126). 503001
 OASIS SCHOOL, Rayadurg, Hyderabad 500028; Ph: 31911; Sec: S Mallikarjana Rao (B: 6, C: 55).
 RADHA KRISHNA DAIRY FARM, Dirusumarru PO, Bhimavaram Mardalam, Dist West Godavari; Ph: 81 (Gollavanitippa); Mg Ptnr: Alluri Bangaruraju (B: 5, C: 8).
 RAM REDDY, PATI, Velugupally, Tungatutur Tq, Nalgonda Dist (Strength: 21).
 RAMANA RAO, K, Bhavanipuram, Vijayawada 520001 (Strength: 60).
 RATNAM, V V, Vill Gudlavalleru 521356, Krishna Dist.
 RAVI POULTRY & DAIRY FARM, PO Chinna Kandukur, via Vengapally, Bhongir Tq -- G Narender Reddy.

See also LATE ADDITIONS at the end of the listing

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Calcium Borogluconate B. Vet. C.
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PHARMACEUTICAL DIVISION
VETERINARY DEPARTMENT

21 D.S. Marg, Fort,
Bombay 400 001.

RAYUDU FARMS, Tanuku 534211, West Godavari Dist; Ph: 2808; Prop: Mullapudi Narendra Nath, Ph (resi): 2421 (Strength: 133).

REDDY, A NARSIMHA, 17-2-840 Madannapeta, Hyderabad; Ph: 557678 (B: 46).

RISHI VALLEY EDUCATION CENTRE (KFI), Rishi Valley 517352, Dist Chittoor; Ph: 37 (Madanapalle Ex); Mgr, Rishi Valley Dairy: P V Ramana (Strength: 49).

S V DAIRY FARM, Tirupathi 517502; Ph: 2420; Farm Supdt: Dr P Konda Reddy (C: 160, H: 175).

SATYANARAYANA, G, c/o G H Hanumantappa Setty & Sons, Gooty Rd, Anantapur.

SREE VIJAYAWADA GOSAMRAKSHANA SANGHAM, Vijayawada; Ph: 62756; Sec: Sitaram Gilda (Strength: 90).

SREERAMULLU, VEGULLA, s/o Ramamurthy, Mandapeta 533308.

SRI KRISHNA GOSEVA MANDAL, Gopui Goshala, Narasingi, R R Dist (Strength: 110).

SRI LAXMI DAIRY FARM, PO Velugupally, Tal Tuugaturthy, Dist Nalgonda; Prop: P Surender Reddy (B: 3, C: 3).

SRI RAMAKRISHNA DAIRY FARM, Choultry St, Allegadda 518543; Ph: 114; Ptnr: C Ramakrishna Reddy.

SRI VENKATESH GORAKSHANA TRUST, Dabilpuram 501405, Medchal Tq, R R Dist (Strength: 47).

SRINIVASA DAIRY FARM, National Highway No 7, Kandlakoy, via Medchal 501401, R R Dist (Strength: 100).

SUDHA DAIRY & POULTRY FARM, 4/9 Narkoda, Shamshabad 509218; Ph: 63; Ptnr: Suresh Reddy, Ph: 33398.

SUPER DAIRY FARM, Kirikera, Hindupur 515211, Dist Anantapur; Prop: M L Nagarai, Ph: 122 (C: 70).

SURYAPET DAIRY FARM, Opp Vet Hospital, Suryapet 508213, Nalgonda Dist; Prop: Ravindranath Potu, Ph: 100 (C: 10).

T T D DAIRY FARM, Tirupathi 517502, Chittoor Dist (Strength: 220).

VAITLA RANGA RAO DAIRY FARM, Achanta Vemavaram, via Palekol, West Godavari Dist (B: 8, C: 6).

VENKATESHWARA AGRO FARM, Vill Cheriyal, Keesara Mandal, Tal Medchal, R R Dist; Ph: 64804; Prop: N Seetharam Reddy (C: 10).

VENKATRAO, NAKKANTI, Near Rural Bank, Achanta 534123, West Godavari Dist.

VIJAYA DAIRY FARM, Achanta 534123, West Godavari Dist; Prop: Visweswara Rao Reddy (Strength: 10).

YADAV, BALAJIAH, Opp Vet Hospital, Langar House, Hyderabad (B: 60).

YADGIRIGUTTA DEVASTHANAM GOSHALA, Yadgiri-gutta, Nalgonda Dist (Strength: 25).

Assam

BHOGI RAM DAS, Chmn, Kahikuchi Primary Milk Producers' Coop Soc, Vill Kahikuchi, PO Azara 781017, Dist Kamrup (C: 28).

BHUPENDRA DEBA GOSWAMI, Chmn, Rampur Primary Milk Producers Coop Soc, Vill & PO Rampur 781132, Dist Kamrup (C: 10).

BIHEN THAKURIA, Chmn, Satpakhal Primary Milk Producers' Coop Soc Ltd, Vill & PO Satpakhal, Dist Kamrup (C: 3).

BLUE HILL LIVESTOCK FARM, PO Rangagore 786147, Guujan, via Tinsukia; Prop: S K Sen Gupta.

DASARATH RAI, Chmn, Pathor Kuwari Primary Milk Producers' Coop Soc Ltd, Vill Pathar Kuwari, PO Maukhuli 781171, Dist Pragjyotishpur (C: 10).

DIGEN KALITA, Sec, Bortezpur Primary Milk Producers' Coop Soc Ltd, Vill Bortezpur, PO Kukurmara 781134, Dist Kamrup (C: 5).

DHIREN KALITA, Chmn, Jiakur Primary Milk Producers' Coop Soc Ltd, Vill Jiakur, PO Kukurmara 781134, Dist Kamrup (C: 4).

JOY BAHADUR CHETRI, Chmn, Borni Primary Milk Producers' Coop Soc Ltd, Vill Sarutari, PO Bornihat, Dist Kamrup (C: 22).

KHOMLAL GAUTOM, Chmn, Digaru-Amsing Primary Milk Producers' Coop Soc Ltd, Vill Amsing Jorabat, PO Satgaon 781027, Dist Pragjyotishpur (C: 18).

LAKSHESWAR GOSWAMI, Sec, Khatiamari Primary Milk Producers' Coop Soc Ltd, Vill Khatiamari, PO Jarubari, via Bijoy Nagar 781122, Dist Kamrup (C: 12).

NARAYAN ADHIKARI, Chmn, Amerigog (11 miles) Primary Milk Producers' Coop Soc Ltd, Vill Amerigog, PO Jorabat, Dist Kamrup (C: 25).

PHATIK CHANDRA KACHARI, Chmn, Rani Rong Rup Primary Milk Producers' Coop Soc Ltd, Vill & PO Rani, Dist Kamrup (C: 3).

RAM PANT, Vill Amsing Jorabat, PO Satgaon, Dist Pragjyotishpur (C: 15).

SANTA CHETRI, Vill Pathar Kuwari, PO Maukhuli 781171, Dist Pragjyotishpur (C: 10).

TIKA RAM SARMA, Chmn, Patgaon Primary Milk Producers' Coop Soc Ltd, Vill Patgaon, PO Bangara, Dist Kamrup (C: 20).

ZAHIRA POULTRY & DAIRY FARM, Gorajan, PO Borkhola 788110; Ph: 46 (Titbar Ex) — M S Rehman.

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- KHAGARIA DAIRY FARM, Kamalpur, Khagaria 851204; Prop: Jai Prakash (B: 2, C: 10).
- SHASHI DAIRY FARM, At & PO Mahui 845103, via Harinagar, Dist West Champaran; Ph: 51; Ptnr: Satish Chandra Pandey (B:11,C:10).
- SREE TATANAGAR GAUSHALA, Jugsalai, Jamshedpur 831006; Ph: 24289; Hon Sec: Chimanlal Bhalotia; Mgr: Mahanth Tewari (C: 226).
- TIRUPATI DAIRIES, Poddar Kothi, Karnibad, Deoghar; Ph: 656; Prop: Rajesh Poddar (C: 110).
- TISCO DAIRY & POULTRY FARM, PO Agrico, Jamshedpur 831009; Ph: 24057; Supdt: Dr A S Sinha (C: 110 Crossbreds).

Delhi

- ADARSH COOPERATIVE DAIRY SOCIETY LTD, Plot No 287-88 Nangli Sakrawati Colony, Delhi.
- BAJAJ CATTLE DAIRY FARMS, B-561 Sudershan Park, New Delhi 110015; Ph: 5419497; Prop: Surender Bajaj (B: 90, C: 80).
- BAJAJ, SITA FARM, Dairy Complex, Kakrola, Delhi (B: 80, C: 30, HC: 20).
- BEARAT COOPERATIVE DAIRY SOCIETY LTD, Vill Madanpur Khadar, Delhi.
- BROWN COW DAIRY FARM, Vill Gadaipur, Near Mehrauli, New Delhi 110030; Ph: 660937, 664151; Prop: Gobind Sadan; Farm Mgr: Gurdev Singh (B: 50, C: 100).
- DELHI STATE COOPERATIVE MILK FEDERATION LTD, 7/345 Anaj Mandi, Shahdara, Delhi 110032.
- DERA FARMS, D-429 Defence Colony, New Delhi 110024; Ph: 626864; Prop: Arun Kripal (C: 6).
- GARHI MENDU COOPERATIVE MILK PRODUCERS SOCIETY LTD, Vill Garhi Mendu, PO Bhahanpura, Delhi.
- GAZIPUR COOPERATIVE DAIRY SOCIETY LTD, Vill & PO Gazipur, Delhi 110091.
- GOEL MILK DAIRY FARM, B-3/36 Ashok Vihar, Phase II, Delhi 110052; Ph: 743289; Ptnr: Satish Goel (B: 75).
- HARIHAR COOPERATIVE DAIRY SOCIETY LTD, B-20 Harijan Basti, East Gokulpur, Delhi.
- KASTURI LAL & BROS, Ghazipur Dairy Complex, Delhi 110091; Chief Exec: Kasturi Lal (Strength: 400).

- KHAIRA COOPERATIVE DAIRY SOCIETY LTD, Kakrola Dairy Colony, Najafgarh, Delhi 110043.
- OBEROI FARMS, Mohan Bagh, Kapasheera, Delhi (B: 10, C: 75).
- PARAS MILK PRODUCER COOPERATIVE SOCIETY LTD, Vill & PO Jashola, Badarpur, Delhi 110044.
- PARSHOTAM LAL, Dairy Complex, Nangli Sakrawati, Delhi (B: 100, C: 20).
- RATTAN COOPERATIVE DAIRY SOCIETY LTD, Plot No 271-72 Nangli Sakrawati Dairy Colony, Delhi.
- SEWA RAM, C-32 Ghazipur Dairy Farm, Delhi 110091; Ph: 742620 (B: 90, C: 60).
- SHAHRA COOPERATIVE MARKETING SOCIETY LTD, 7/345 Anaj Mandi, Shahdara, Delhi 110032.
- SHANKER DAIRY FARM, B-29 Ghazipur Dairy Complex, Road No 2, Delhi 110091; Ph: 522297; Chief Exec: Subhash Arora (B: 60, C: 35).
- SHIV SHAKTI VIKAS DAIRY SOCIETY LTD, Gazipur Dairy Farm, Delhi 110091.
- UNIVERSAL POULTRY & DAIRY FARM, c/o Bhagwan Dass & Co, Kashmere Gate, Delhi 110006; Ph: 2522263; Ptnr: Harinder Katyal, Ph (resi): 2515252 (C: 40, H: 20).
- VIRENDRA DAIRY FARMS, Virendra Bhatnagar Puram, Mehrauli-Gurgaon Rd, New Delhi — U K Bhatnagar.

Your Attention Please!

If you have an entry in the YEARBOOK, you may suggest the names of individuals/organizations who do not at present appear but whom you consider worthy to be included in the Yearbook. Please send us a postcard with names and addresses of any suitable persons/organizations to whom we will be glad to send a data form.

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Goa

- BHIDE, GANAPATI T, Vill Mangueshi, Goa.
 CHITNIS, KRISHNAJI G, Vill Netravalli, Goa.
 DESAI, DEVAPPA S N, Vill Fatorda 403602, Goa.
 DESAI, VASSUDEV FAL, Vill Painguinim, Goa.
 DON BOSCO DAIRY FARM, Don Bosco Agro-Ed Complex, Sulcorna, Rivona PO, Via Quepem, Goa 403705; Mgr: Bro Vincent Nigrel, sdb (C: 60).
 FALERO, ORLEND, Margaon 403601, Goa (Strength: 15).
 GAONKAR, DATTARAM, Vill Betoda, Goa.
 GAONKAR, SHRIPATI, Vill Dhavshire, Goa.
 GAVALI, DAMU LAXMAN, Vill Netravalli, Goa.
 JOSHI, KRISHNA M, Vill Gawane, Goa.
 KERI, PRABHAKAR, Vill Kuncolim, Goa.
 MAHALE, SHASHIKANT, Vill Tambose, Goa.
 MEHER FARMS PVT LTD, Uguem, Sanguem, Goa; Mgr: Francis Xavier Gomes (B: 35, C: 38).
 NAIK, SUNIL, Vill Kuncolim, Goa.
 NAIK, VITHAL, Vill Pirna, Goa.
 NUNES, DESMOND, Aujuna, Bardez, Goa (Strength: 25).
 PADIYAR, VINAYAK R, Vill Maina, Goa.
 PIRLA DAIRY FARM, Pirla, Panaji 403001, Goa.
 PRABHU, SURESH, Vill Painguinim, Goa.
 PRABHU DESAI, RANU A, Vill Rivon, Goa.
 RANE, PRATAPSING, Sanguelim 403505, Goa (Strength: 15).
 RANE, SHAMRAO, Vill Advoi, Goa.
 RANU DESAI DAIRY FARM, Colomb, Goa (Strength: 20).
 SAHAKARI, MADHAV, Curti, Ponda, Goa 403401.
 SAHAKARI, UDAY, Vill Collem, Goa.
 SHIRODKAR, PADMANABH, Mapuca 403507, Bardez, Goa (Strength: 15).
 TENDULKAR, PRADIP, Vill Shiroda, Goa.

Gujarat

- AKSHAR PURUSHOTTAM GAUSHALA, Bochasan 388140, Tq Borsad, Dist Kaira.
 AKSHAR PURUSHOTTAM MANDIR GAUSHALA, PO & Tq Gondal 360311, Dist Rajkot.
 AKSHAR PURUSHOTTAM GAUSHALA TRUST, Sarangpur, Tq Dhandhuka, Dist Amdavad, Ph: 295 (Botad Ex); Head: Bhaktavatsaldas Kothari (B: 13, C: 50).
 AMAR FARM, At & PO Paldi 384315, Tq Visnagar, Dist Mehsana; Prop: Mansinhbhai V Chaudhari (B: 4, C: 5).

- AMBIKA FARM, Vill Kherva, Tq & Dist Mehsana; Ph: 27; Mgr: Kantilal J Patel (B: 3, C: 3).
 B K FARM, At & PO Chhala 382321, Dist Gandhinagar; Prop: Chaturbhai Kalidas Patel (Strength: 100).
 BHAKTAVASTAL, KOTHARI SADHU, Vill & PO Sarangpur, Tq Dhandhuka 382460, Dist Ahmedabad.
 BHARWAD, BHULABHAI GAGJIBHAI, Vill Lilapur, PO Sarandi, Tq Dholka 387810, Dist Ahmedabad.
 BHARWAD, DHANABHAI KANABHAI, Vill Madipara, Tq Dhrangadhra 363310, Dist Surendernagar.
 BHARWAD, RAGHA DEVAR, Vill Bharwadpara, Tq Wankaner 363621, Dist Rajkot.
 BHAYANI, AJITBHAI KARASHANBHAI, Kalsari 362132, Dist Junagadh.
 BHUT, BARANJI KARAMASHI, Vill Moti Marad 360421, Tq Dhoraji, Dist Rajkot.
 BHUVNESHWARI PITH GAUSHALA, Gondal 360311, Dist Rajkot.
 BIDA PINJRAPOLE & GAUSHALA, Tq Mandvi 394160, Dist Kutch.
 CHANDRAKANT REVA SHANKAR SEVAK, Vill & PO Pandva 388265, Tq Balasinor, Dist Kheda.
 CHAUDHARY, BAPUJI KALAJI, At & PO Amja 382735, Tq Kalal, Dist Mehsana (B: 6, C: 4).
 CHAUDHRI, BABUJI KALAJI, Vill & PO Ameja, Tq Kalol 382721, Dist Mehsana.
 CHAUDHRI, RAMNIK LAL KESAV LAL, Vill & PO Paldi, Tq Visnagar 384315, Dist Mehsana.
 CHAUDHRI, RAMSANGJI GALABHAI, Vill Rampura (Anjupura), PO Amja, Tq Kalol 382721, Dist Mehsana.
 CHAUDHURY, SHAMJIBHAI SHANKARBHAI, Vill Gokulgadh, Tq & Dist Mehsana (Strength: 25).
 DANDUCHACHI, SULAMAN, Vill & PO Kuvavada, Tq & Dist Rajkot.
 DESAI, DALUBHAI S, Chmn, Banas Dairy, PB No 20, Palanpur 385001, Dist Banaskantha; Ph: 2259 (C: 8).
 DESAI, JETHABHAI BHAGWANBHAI, Vill Khimana, Tq Kamraj, Dist Banaskantha.
 FATHER JOSEPH, At & PO Dhola 364320, Dist Bharuch (Strength: 40).
 GADHVI DAIRY FARM, Vill & PO Adipur 370205, Tq Anjar, Dist Kutch.
 GANGA FARM, Vill Kherva, Tq & Dist Mehsana; Ph: 22; Mgr: Natvarlal K Patel (B: 15).
 GAYATRI BUFFALO BREEDING FARM, Garida Tq, Wankaner, Dist Rajkot; Prop: Valabhai Jethabhai Rajgor (B: 52, C: 13).
 GHELABHAI PUNJABHAI, c/o Nandanvan Society, Tq & Dist Jamnagar.
 GODHAVI, DEVIDAN GANGADAS, 4/B FA-2 Gandhidam, Tq Anjar 370110, Dist Kheda.

GOPAL FARM, Vill Kherva, Tal & Dist Mehsana;
Mgr: Babubhai A Patel (B: 7, C: 4).

GROLA, KHIMA, Vill Bharatpur, Tq Bhanvad
360510, Dist Jamnagar.

JALULPUR VATIKA, Vill Jalalpur, Tq Dholka,
Dist Ahmedabad; Prop: Manubhai J Patel;
Ph: 676.

JETHABHAI, VALABHAU, PO Mahika 363627, Vill
& Tq Wankaner, Dist Rajkot.

KETU FARM, At & PO Paldi 384315, Tq Vis-
nagar, Dist Mehsana; Ph: 2380; Prop:
Ramniklal Keshavlal Chaudhari (B:11,C:4).

KYADA, BABUBHAI VIRJIBHAI, Vill Jalia
364616, Tq & Dist Amreli.

LAXMI DAIRY FARM, 6 New Assn Bldg, Dhoraji
360410; Ph: 52, 109; Prop: Harilal
Chhaganlal (C: 12).

LAXMI FARM, Vill Kherva, Tal & Dist Mehsana;
Ph: 43; Mgr: Babubhai S Patel (B:4,C:5).

MANSA GAUSHALA TRUST, Mansa, Vijapur 382870,
Dist Mehsana.

ODEDARA, KHIMA GHELA, Vill Daliya, Tq Gondal
360311, Dist Rajkot.

PANCHVATI FARM, At Limbadiya, PO & Dist
Gandhinagar; Prop: Manubhai Kalidas
Patel (Strength: 150).

PARMAR, DEVSIBHAI M, At & PO Sanjeli 389175,
Dist Bharuch (Strength: 21).

PATEL, AMBALAL FULABHAI, Vill & PO Borsad
388540, Dist Kheda.

PATEL, BACHUBHAI NAVSIBHAI, 27 Patel Nagar,
A K Rd, Surat 395006.

PATEL, BALVANTBHAI BHIKHABHAI, Vill Mahadev
Falia (Nanibhagor Dakor), Dist Kheda.

PATEL, BHIKABHAI KALIDAS, 6 Patel Nagar,
Ashwanikumar Rd, Surat 395006.

PATEL, CHIMANBHAI JOITABHAI, Vill & PO
Borita, Tq Vijapur 382870, Dist Mehsana.

PATEL, DAHAYABHAI RANCHODBHAI, 37 Patel
Nagar, Ashwanikumar Rd, Surat 395006.

PATEL, GIRDHARBHAI MAGANBHAI, Vill & PO
Chandrala, Tq Dahegam 382305, Dist
Ahmedabad.

PATEL, GORDHANBHAI ASHABHAI, 42 Patel Nagar,
Ashwanikumar Rd, Surat 395006.

PATEL, HARILAL BHINJI, Vill Somar, Tq Muli
363510, Dist Surendranagar.

PATEL, HIRALAL CHHAGANLAL, Dhoraji 360411,
Dist Rajkot.

PATEL, ISHWARBHAI NAGINBHAI, Vill Vanz, Tq
Choryashi, Dist Surat.

PATEL, JAYANTIBHAI AMBALAL, Vill Tarapur
388180, Tq Khambhat, Dist Kheda.

PATEL, KANTIBHAI KHEMABHAI, Vill Kansarakui,
Tal Visnagar, Dist Mehsana.

PATEL, KANTIBHAI NAJIBHAI, Vill & PO Brah-
mangam, Tq Borsad 388540, Dist Kheda.

PATEL, KARSAMBHAI KADWABHAI, Vill Nasadi,

Tq Savarkundla 364515, Bhavnagar Dist.

PATEL, KASHIBHAI PUNJABHAI, Bhavandas St,
Ode 388210, Tq Anand, Kheda Dist (B: 2).

PATEL, KHEDABHAI JETHIDAS, Vill Brahmanwada,
Tq Sidhpur, Dist Mehsana.

PATEL, SMT MANIBEN MAGANBHAI, Vill Kuvasana,
Tq Visnagar 384315, Dist Mehsana.

PATEL, MANUBHAI RANCHODBHAI, Vill & PO
Chandrala, Tq Dahegam 382305, Dist
Ahmedabad.

PATEL, NATVARBHAI KESHAVALAL, Vill Kherva,
Tq & Dist Mehsana.

PATEL, PARSOTTAM SHIVRAM, Vill & PO Kuvas-
ana, Tq Visnagar 384315, Dist Mehsana.

PATEL, PURSHOTTAMDAS KALYANBHAI, PO Ghun-
teli 388440, Tq Petlad, Dist Kaira (C:3).

PATEL, RAMANBHAI BABABHAI, Vill & PO Vagh-
rota, Tq Prantij 383205, Dist Sabarkantha.

PATEL, RAMANBHAI SOMABHAI, 36 Patel Nagar,
A K Rd, Surat 395006.

PATEL, RATILAL CHATRUBHAI, At & PO Luna,
Tq Padra, Dist Baroda (B: 9, C: 2).

PATEL, RATILAL SOMABHAI, 40 Patel Nagar,
A K Rd, Surat 395006.

PATEL, SMT SHANTIBEN PRAHALADBHAI, Vill &
PO RAMNAGAR, Tq Kalol 382721, Dist Mehsana.

PRABHUDAS BHANAJI TRAMBADIA, Near Chora, At
Talala (uir) 362150, Dist Junagadh —
Amrutlal B Trambadia (B: 9).

RABARI, CHHALABHAI JIVABHAI, Vill & PO Amba-
liayasan 382732, Dist Mehsana.

RAMESH FARM, 34 Patel Nagar, A K Rd, Surat
395008; Ph: 42085; Prop: Ramesh Patel
(B: 20, C: 2).

SAKHAWALA, BABUBHAI NARANBHAI, Vill Moti
Khilori, Tq Gondal, Dist Rajkot.

SANCHALAK GOKUL GAUSHALA, Vill & PO Gram
Bhartie, Tq Kalol 382721, Dist Mehsana.

SARVODHYA ASHRAM, Vill Shamlaji 383355,
Tq Bhiloda, Dist Sabarkantha.

SEVAK, CHANDRAKANT R, At & PO Pandwa 388265,
Tq Balasinor, Dist Kaira; Ph: 37 (B:2,C:1).

SEVAK, PUNAM CHAGANBHAI, Vill Pandwa 388265,
Tq Balasnor, Dist Kheda.

SHREE BHUVANESHWARI PITTH GAUSHALA, Mahadev
Wadi, Gondal 360311; Ph: 595, 599; Offr:
G D Rajyaguru (C: 22, H: 10).

SHREE RAM FARM, At & PO Paldi 384315, Tq
Visnagar, Dist Mehsana; Prop: Mansinbhai
Jethabhai Choudhari (B: 7, C: 2).

STERLING POULTRY & DAIRY FARM, Vill Ularia,
Sanand Rd, PO Santhal, via Sarkhej 382210,
Dist Gandhinagar; Ph: 412918; Prop:
Kishore H Clerk.

TRAMBADIA, PRABHUDAS BHAUJI, Vill Talala
362150, Dist Junagadh.

UMARAOMYA, MALIK FAKMIMIYA, Vill Bhalej
388205, Tq Anand, Dist Kheda.

VALLABHABHAI, DHIRUBHAI, Vill Vankaner
394620, Tq Bardoli, Dist Surat.
VAMJA, MAGANBHAI HARIBHAI, Vill Vanthali,
Tq Vanthali, Dist Jamnagar.
VIRAM, KARA, Vill Arda, Tq Porbandar 360575,
Dist Junagadh.
VODHAR, NAGAJBHAI ARJUNBHAI, Vill Rasulpura,
Tq Talala 362150, Dist Junagadh.
ZAVERI DAIRY FARM, Kathwada, Ahmedabad
382430; Ph: 887867, 887337; Ptnr: Dhiren
P Zaveri.

Haryana

AJIT SINGH, s/o Ujjagar Singh, Vill Kachhwa
132025, Dist Karnal (Strength: 20).
ALLAHMADI, OM PRAKASH, Umera Gate, Hansi,
Dist Hisar.
ANAND DAIRIES LTD, Vill Samanavahu, G T Rd,
Dist Karnal; Chmn & Mg Dir: Anand Dev
Sharma.
ARPANA DAIRY, c/o Arpana Trust, Madhuban,
Karnal 132001; Ph: 4089, 4079; Chief
Exec: Kamal Kumar (B: 1, C: 16).
ATWAL, KARTAR SINGH, Vill & PO Durala, Teh
& Dist Kurukshetra; Ph: 515.
AVTAR SINGH, Gali No 8, near Gurudwara,
Jawahar Nagar, Hisar.
BALBIR, Vill & PO Bambolia, Block Nahar,
Teh Jhajjar 124103, Dist Rohtak.
BALBIR SINGH, s/o Chhalu Ram, Vill & PO
Kadana, Teh Charkhi Dadri 123306, Dist
Bhiwani.
BALBIR SINGH, Vill Garhi Bohar, Dist Rohtak.
BALJIT, s/o Neki Ram, Vill Bambolia, Block
Nahar, Teh Jhajjar 124103, Dist Rohtak.
BHAJAN LAL, s/o Horji Ram, Vill Mahalsara,
PO Kalirawan, Block Adampur, Dist Hisar.
CHAMAN LAL, s/o Shiv Dayal, Jatpura Rd,
Vill Kachhwa 132025, Dist Karnal
(Strength: 20).
CHAMAN LAL SUSHIL KUMAR, E-350 Opp Arjun
Gate, Karnal 132001 (B: 58, C: 30).
CHANDER BHAN, s/o Bohraolal, Vill Rampura,
Block Hansi, Dist Hisar.
CHARANJIT, Sadar Bazar, Karnal 132001
(Strength: 34).
DESWAL DAIRY FARM, Vill & PO Anta, Teh
Safidon 125112, Dist Jind — Jasbir
Singh Deswal (B: 8, C: 6).
DEV SINGH, s/o Hira Singh, Vill & PO Rania
125076, Dist Sirsa.
DHAWAN, AMAR NATH, Nambardar, c/o Petrol
Pump, near Bus Stop, Gohana, Sonapat
Dist (C: 200).

FATEH PAL SINGH, Vill & PO Ramba, Teh &
Dist Karnal (B: 5, C: 40).
GURBACHAN SINGH, Vill Budhakhera, Dist
Karnal (B: 20, C: 6).
HARBHAJAN SINGH, s/o Sewa Singh, Vill Dabri,
Dist Karnal (Strength: 20).
HUKAM CHAND, s/o Kure Ram, Vill & PO Barahi
124525, Teh Bahadurgarh, Dist Rohtak.
JAGAT DAIRY, Vill & PO Gouripur, Kalyana,
via Shahabad, Dist Kurukshetra; Ph: 272;
Prop: Amar Raj Singh (C: 34).
JEETA SINGH, s/o Avtar Singh, Vill Dabri,
Dist Karnal (Strength: 20).
KABIZ, s/o Chhaju Ram, Vill Kalampur, Dist
Karnal (Strength: 20).
KARTAR SINGH, s/o Kharak Singh, Vill & PO
Assand, Dist Karnal (B: 22, C: 5).
KARTAR SINGH, s/o Tek Chand, PO Badli
124105, Teh Bahadurgarh, Dist Rohtak.
KATYAL DAIRY FARM, Vill Garhi Harsaru,
Pataudi Rd, Gurgaon Dist (B: 10, C: 50).
KHUMANA RAM, Vill & PO Lambi, Block Daba-
wali, Dist Sirsa.
KHURANA, KRISHAN LAL, Vill & PO Khurava,
Dist Rohtak.
KHURANA, RAJIV, 1053 Bhiwani Gate, Rohtak.
KRISHAN LAL, Abrahm Mandi, Karnal 132001
(Strength: 25).
KRISHAN LAL, s/o Tek Chand Yadav, Rampura,
PO Dhankalan, Teh Hansi, Dist Hisar.
LAL SINGH, Jatton Mohalla, Karnal 132001
(Strength: 22).
MALLIK, KHARATI LAL, Near AI Sub Centre,
Patel Nagar, Hisar.
MANI RAM JANGRA, Vill & PO Gangnur, Dist
Hisar.
MANPHOOL SINGH, Vill Ranwar
(Strength: 23).
MEHTA, SANT LAL, Umera Gate, Hansi, Dist
Hisar.
MEHTA, SIKANDARLAL, Vill Saudapur, Panipat,
Dist Karnal (C: 20).
MIGLANI, AMAR NATH, Gali No 2, Jawahar
Nagar, Hisar.
MOHAR SINGH, s/o Sulakhan Singh, Vill Dabri,
Dist Karnal (Strength: 20).
MOHAR SINGH, s/o Sewa Ram, Vill & PO Kurri,
Dist Rohtak.
MOHINDER SINGH, s/o Gyan Singh, Vill
Kachhwa 132025 (Kachhwa Karnal Rd),
Dist Karnal (Strength: 20).
MOHUNTA DAIRY FARM, Jind Rd, Kaithal 132027,
Dist Kurukshetra; Ph: 2478; Prop: Man
Mohan Mohunta (B: 2, C: 15).
MUKHTIAR SINGH, s/o Matu Ram, Vill Kalampur,
Dist Karnal (Strength: 20).
NARULA DAIRY FARM, Madanpuri, Near Pataudi
Chowk, Gurgaon; Prop: Hukam Chand Narula,

Ph resi: 2792 (C: 40).
 NATHU RAM, s/o Khem Chand, Vill & PO Kulin,
 Dist Hisar.
 OM PARKASH, s/o Bhup Singh, Vill Mahalsara,
 PO Kalirawan, Dist Hisar.
 PARITAM SINGH, s/o Chanda Singh, Kachhwa
 Karnal Rd, Vill Kachhwa 132025, Dist
 Karnal (Strength: 20).
 PHUMAN SINGH, Vill Khaja, PO Sirsa.
 PIYARA SINGH, s/o Harnam Singh, Vill & PO
 Uklana 126009, Dist Hisar.
 PREM SINGH, Vill Phusgarh
 (Strength: 21).
 RAJPUT, BHAGWAN DASS, Kemer Rd, Patel
 Nagar, Hisar.
 RAM MEHAR NANDA, Vill & PO Kablana, Teh
 Jhajjar 126102, Dist Rohtak.
 RAM SINGH, s/o Bhup Singh, Vill Mahalsara,
 PO Kalirawan, Block Adampur, Dist Hisar.
 RAM SINGH, Vill Dadupur Khurd, Dist Karnal
 (B: 6, C: 35).
 RAMESHEWAR DUTT, s/o Roop Ram Yadav, Vill
 Rampura, PO Dhanakalan, Teh Hansi, Dist
 Hisar.
 RAMPAT, s/o Mansingh, Vill Rampura, PO
 Dhanakalan, Teh Hansi, Dist Hisar.
 RAMSARUP, s/o Hans Ram, Vill Rampura, PO
 Dhanakalan, Teh Hansi, Dist Hisar.
 RAWAL, BALWANT, Umera Gate, Hansi, Dist
 Hisar.
 SATGURU HARI SINGH CATTLE BREEDING FARM,
 Jivannagar, Hisar.
 SATISH KUMAR, s/o Lalji Singh Yadav, Vill
 Rampura, PO Dhanakalan, Teh Hansi, Dist
 Hisar.
 SHARMA, T C, Near K R Theatre, Meerut Rd,
 Karnal (C: 12).
 SHER SINGH, s/o Hans Ram Yadav, Rampura,
 PO Dhanakalan, Teh Hansi, Dist Hisar.
 SIKANDERPUR AGRICULTURAL FARMS, Vill
 Sikanderpur 125060, Dist Sirsa; Ph:
 20850; Ptnr: Rana Ranbir Singh Grewal
 (B: 15, C: 200).
 SRI KRISHNA ADARSH GOWSHALA, Gohana, Dist
 Sonapat; Ph: 52; Sec: Ram Sarup Gupta
 (C: 180).
 SUJAN SINGH, s/o Chandu Ram, Vill & PO
 Kharia, Dist Hisar.
 SURAT SINGH, s/o Singhu Ram, Vill Kalampur,
 Dist Karnal (Strength: 20).
 SURENDER SINGH, s/o Bhagwan Singh, Dairy No
 15, Rohtak.
 TARACHAND, s/o Mam Raj, Kalandri Gate,
 Karnal (B: 20).
 TARLOK SINGH, s/o Ishwar Singh, Zarifabad
 Rd, Vill Kachhwa 132025, Dist Karnal
 (Strength: 20).

TIKA RAM, Jatton Mohalla, Karnal 132001
 (Strength: 21).
 USHA STUD FARM, Carterpuri, Dist Gurgaon --
 Mehra (C: 30).
 VIJAY AGRICULTURE FARM, Vill Raudholi, PO
 Beana, Dist Karnal (B: 8, C: 16).
 YADEV DAIRY FARM & AGRICULTURAL FARM, Ram-
 pura, PO Dhanakalan, Teh Hansi, Dist
 Hisar; Prop: Chanderbhan Yadav (B:5,C:2).
 YESHWANT SINGH, Vill Unchagaon, Ballabgarh
 121004, Dist Faridabad.

Karnataka

ANNAPURNA RICE & PHOVE MILLS, Bveera Pura,
 Bhadravati 577301.
 ARKERE, GOPALAREDDY, Bannerghatta Rd, Banga-
 lore 560076.
 ARUN DAIRY, Vishweshwarnagar, Hubli 580032;
 Ph: 62209; Prop: G S Chandrasherkarappa
 (B: 13, C: 32).
 ARUNA DAIRY FARM, c/o Shetty Ice Cream Co,
 Kulai, Dist Dakshina Kannada; Ph: 7234,
 7292; Mgr: Dr J P Bhandary (B: 100, C:30).
 ASIRVANAM CATTLE BREEDING FARM, Asirvanam
 Monastery, PO Kumbalgud, Bangalore
 560074; Ph: 30 (Kumbalgud Ex); Incharge:
 Fr Paul; Asst: Fr Boniface OSB (C: 585).
 ASWATHNARAYANA RAO, Brindavan Estate, Mysore
 Rd, Kengeri, Bangalore South.
 AWANTHI FARM, Madavara Post, Bangalore 560074.
 BAJAJ TRUST, Vishwaneedam Post, Bangalore
 560091 (C: 70).
 BHAVALIN MILK DAIRY, D No 257, Kshetrian
 Vth Cross, K R Mohalla, Mysore 570024;
 Prop: Ramappa (C: 25).
 Bhole, SMT MALTI K, Bhole Bungalow, No 2
 Bangur Nagar, Dandeli 581362; Ph: 26
 (C: 20).
 BUMPER DAIRY FARM PVT LTD, 32, 5th Block,
 Coromangla, Bangalore -- Zaidi.
 C T C DAIRY, Sarjapur Rd, Bangalore.
 CHAMUNDESWARI MILK SUPPLIES, Vinoba Rd,
 Shivaranpet, Mysore 570001; Prop: H
 Krishnappa (C: 27).
 CLARET BHAVAN DAIRY, Sarjapur Rd, Bangalore.
 DEEJAY RESEARCH & BREEDING FARM, Chokkana-
 halli, Jakkur PO, Bangalore 560064.
 DEVADAN FARM, PO Kumbalgud 560074, Bangalore
 South; Ph: KBD 22 (B: 136).
 DEVENAHALLI LIVESTOCK & STUD FARM, Devana-
 halli, Bangalore Dist.
 DEVIEGOWDA & SONS, 23 Bazaar St, Gokula
 Nivas, Adugodi, Bangalore 560030; Prop:
 D Deviegowda (B: 10, C: 20).

DHARMARAM COLLEGE DAIRY FARM, PO Dharmaram College, Bangalore 560029; Ph: 40381 (C: 190).

DR MURTHY'S FARM, Bilvardahalli, Gottigere PO, Bannerghatta Rd, Bangalore 560083; Ph: 42258 (B: 3, C: 6).

FALCON FARM, Kothnaur Rd, St Joseph College Post, Bangalore 560083.

GANESH DAIRY, 77 Shankara Park, Basavanagudi PO, Bangalore 560004; Ph: 604614; Prop: A V Subramaniam (B: 7, C: 16).

GANESH DAIRY, Banawasi Rd, Sirsi 581401, North Kanara Dist; Prop: Sharad R Telang (C: 25).

GEETHA MILK DAIRY, Kalamma Temple St, Mysore; Prop: Mahadeviah.

GHAROUNDA FARM, 13 Km Bannerghatta Rd, Bangalore 560076; Ph: 42620; Chief Exec: Waheeda Rekhy (C: 30).

GOPATHI FARM, Jalahalli, Bangalore 560013.

GOVARDHANA, 913 Lakshmipuram, Mysore 570008 — B A Naniah.

GOVERDHAN DAIRY FARM, 1704 Ramadeogalli PO, Belgaum 590002; Ph: 20454, 23454; Prop: Smt B S Balekundri (B: 60, C: 50).

GRASIM JANASEVA TRUST DAIRY FARM, Grasim Colony Administration, Kumarapatnam 581123; Mgr (Admn): Brig S K Prasad (retd) (C: 74).

GUNDAPPA, B, c/o Ramesh Gottigere, Gottigere, Bannerghatta Rd, Bangalore 560083.

HEGDE, R M, At Gadikai, Post Bhairumbe, Sirsi Tq 581401, Dist Karwar.

HILL TOP DAIRY & POULTRY FARM, Aldur 577111, Chikmagalur Dist; Ph: 226; Prop: Smt Jameelunnisa Asghar (B: 13, C: 42).

HOLY SPIRIT CONVENT, Bannerghatta Rd, Bangalore 560083.

HONNAPPAREDDY, Bunnir Bande Rd, Hulimare, Bannerghatta Rd, Bangalore 560083.

HYMU FARMS, Devanahalli-Dodballapur Rd, Off Bellary Rd, Bangalore; Prop: K V Aiyar (C: 25).

INDIAN SOCIAL INSTITUTE, 24 Benson Rd, Bangalore 560046.

IQBAL AHMED, c/o Royal Picture Palace, Bellary.

J V R ESTATE, 403-A Queens Corner, Queens Rd, Bangalore 560001.

KALPARUKSHA DAIRY FARM, Kembathhalli Vill, Uttaraalath Hobli, Gottigeri PO, Bangalore 560083; Prop: K C Narashimaha (B: 3, C: 20).

KALTHUR DAIRY LIVESTOCK FARM, Vodarahalli Vill, Chickabettahalli PO, Bangalore North; Ph: 138; Mg Ptnr: K K Mathukutty Vaidhyan (C: 150).

KAMAT DAIRY, Machohalli Vill, Tq Nelamangala, Bangalore Dist; Prop: Kamat Restaurants Ltd (C: 300).

KAMATH, GOVINDRAI, Magadi Rd, Bangalore.

KARUNALAYAM FARM, Sarjapur Rd, Bangalore.

KASHI DAIRY FARM, Shashi Nivas, B H Rd, Arsikere 573103, Hassan Dist; Chief Exec: K V Prakash (C: 20).

KAVERI FARM, Bilvardahalli, Gottigere PO, Bangalore 560083; Ph: 40300 (C: 10).

KOTHNOUR, RUDRAPPA, Kothnour Rd, Gottigere Post, Bangalore 560083.

KRISHNA MANDIRI & SONS, 38 Nehru Nagar, Bangalore 560020; Ph: 33813; Prop: M Ravindranath (C: 55).

KRISHNA, G, No 60, 5th Cross, Sri Rama Puram, Bangalore 560021.

KUMAR, SMT P, c/o Highclere Stud Farm, Hoskote, Bangalore 560005.

LIONS FARM, Basavanapura, Gottigere PO, Bannerghatta Rd, Bangalore; Ph: 42438; Prop: G D Bakthvathsala (C: 9).

M M FARM, Near Puttaiahnapalya, Sarakki Rd, J P Nagar, Bangalore 560078.

METBANDE FARM, Kendatti Vill, Narasapur, Kolar Tq; Ph: 44; Chief Exec: B A Vijaya Kumar (C: 35).

MOTHA, LT-COL B, 24/2 Davis Rd, Richards Town, Bangalore 560005.

MUKKA WELFARE SOCIETY (REGD), Jyothi Mandir, Mukka 574177; Ph: 7309; Pres: Rev Fr Vincent Martis (C: 9).

MUNIRATNAM, 38 Nehru Nagar, Bangalore 560020; Ph: 33813.

NAMDHARI SEEDS, Bidadi 562109, Bangalore; Ph: 563910; Ptnr: Harpal Singh (B: 17, C: 25).

NANDISWARA DAIRY FARM, Opp Mavalli Tiffin Room, Lalbagh Rd, Bangalore 560027 — Prakash.

NARAYANAPPA, K, s/o Kempanna Kothnour, Gottigere Post, Bangalore 560083.

NATARAJAN, M K, 87 Coronation Rd, Bangarpet 563114, Kolar Dist.

NATIONAL MILK SUPPLIES, Devamba Agrahar, K R Mohalla, Mysore — V Srinivasu.

PALYA, RAMASWAMAPPA YELIETHOTADA, Gottigere PO, Bangalore 560083.

PANCHVATI FARM, Bilvardahalli, Gottigere PO, Bangalore 560083; Ph: 640411; Ptnr: Amberish Nagarkotti (B: 4, C: 47, H: 10).

PARADISE FARM, Kothnuru Vill, PO Gottigere, Bangalore 560083 — Geoffrey Downer.

PATEL, G MUNIJAPPA, Kembath Halli, Gottigere PO, Bangalore 560023.

PATIL, V S, c/o R M Joshi, Gamanagatti Rd, Post Navanagar, Hubli.

PESTALOZZI DAIRY, Machohalli Plantation, 17th Km Magadi Rd, Bapagram PO, Bangalore 560091; Prop: A R A Chettiar (C:14).

PRAJYOTHI DAIRY & POULTRY FARM, Kollegal Rd, Bellary — G M Gandhi.

PRESENTATION FARM, Sarjapur Rd, Bangalore.

RAMACHANDRAPPA, G, PO Gottigere, Bannerghatta Rd, Bangalore 560023.

RAVI, T, 80 Sirur Park Rd, Malleswaram, Bangalore 560003.

RAVI RAO FARM, Bellemanie, Kothanur Rd, Near Gottigere, Bangalore 560083 (C:20).

RAVINDRANATH, c/o Hotel Parnam, Kumara Park, Bangalore 560042.

REKHI, MANJEET, Bannerghatta Rd, Bangalore

ROVER DAIRY FARM, Hessarghatta, Bangalore.

SAGAL, Sagal Estate, 130 Mysore Rd, Kengeri Post, Bangalore South.

SAKALVARA, ASHFACK, Bannerghatta Rd Cross, Sakalvara, Bangalore 560083.

SANDUR DAIRY FARM, Sandur 583119, Dist Bellary; Ph: 42, 24; Prop: M Y Ghorpade; Offr Incharge: Dr H R Halambi (C: 300).

SHIMOGA DAIRY, Nelli Krupa, Park Extn, Shimoga 577201; Ph: 2309, 3205; Prop: Smt Sumitra Nelli (C: 40).

SISTER OF SPIRIT HOLY CONVENT FARM, 14th Km Bannerghatta Rd, Bangalore; Ph: 40430; Incharge: Sr Marion (C: 11).

SOMAYYAJI DAIRY FARM, Somayyaji Indl Estate, B C Rd, Buntwal, South Kanara Dist.

SREENIVASA DAIRY, Bannerghatta Rd, Bangalore 560076; Ph: 40969; Chief Exec: K Krishnappa (C: 12).

SRI GOPALAKRISHNA DAIRY FARM, Kudlur Vill, PO Kushaluagar 571234; Prop: P K Govindaraju (C: 95).

SRI RAMAKRISHNA DAIRY, 26 Nagappa St, Nehru Nagar, Bangalore 560020; Ph: 365968; Prop: N Vijayasathy (C: 30).

SRI RAMAKRISHNA VIDYASHALA, Yadavagiri, Mysore 570020; Ph: 22954 (C: 50).

ST JOSEPH'S FARM, Mount St Joseph's PO, Bangalore 560083; Ph: 40441; Mgr: Rev Stany Pinto, sj (C: 20).

ST MARY'S FARM, K Gollahalli PO 560060, Bangalore South; Ph: KBD (C: 130).

SUBRAMANIAM DAIRY, Near Narrang Bar, Off 80's Rd, Rajajinagar, Bangalore; Prop: K Subramaniam (C: 200).

SUBRAMANYAM, A V, A-21 Shanker Park, Basavanagudi 560004, Bangalore Dist.

SUNAWALA, SHEEROY, 20th Km Bannerghatta Rd, Bannerghatta PO, Bangalore 560083.

SUSHEELA BAI MILK DAIRY, 43 Shalivahana Rd, Nazarbad, Mysore 570010; Ph: 25365, 21796; Prop: N A Susheela Bai (B: 15, C: 45).

UMAYAL DAIRY FARM, Suntikoppa 571237, Coorg Dist.

VARADIAH, No 14 (Upstairs), 28th Cross, Kilari Rd, (Near Choice Printers), Bangalore 560053.

VENGRASS FARM, Hesserghatta, Bangalore 560088 — Sashidhar.

VENKATAPPA, 74/12 Mylasandra, Off Hosur Rd, Bangalore 560068.

VENKATESWARA MILK DAIRY, Nazarbad, 10th Cross, Mysore; Prop: B Nagaraj.

VISHWANEEDAM, 13th Km Magadi Rd, Vishwaneedam PO, Bangalore 560091; Ph: 351589; Dir: S A R Acharya (C: 120).

VIZAIE, BELEKHALLI, Bannerghatta Rd, Bangalore 560076.

WOODLANDS DAIRY FARM, 15th Km Bannerghatta Rd, Bangalore; Prop: Vasudev Rao (C: 34).

Kerala

AASHOO CATTLE & POULTRY FARM, 8/142 J M Rd, PO Ponani 679577, Dist Palaghat — V T Kunhi Mohamed.

KURISUMALA ASHRAM, Vagamon 685503, Dist Kottayam; Pres: Francis Acharya; Mgr: Swami Ishananda (C: 60).

PEOPLE'S DAIRY, Vythila, Ernakulam Dist — Devi.

RAJA BHAVAN DAIRY FARM, Alusuram PO, Udyogamandal, Ernakulam Dist — K M Janardhana Panicker.

SARMA, N H, A P V 438 Prasanth, Akandapally PO, Adoor 691523.

Madhya Pradesh

E L C PADHAR HOSPITAL DEMONSTRATION FARM, PO Padhar 460005, Dist Betul; Ph: Betul 83, Padhar 26; Farm Mgr: V K Prasad (B: 5, C: 5).

MADAN DAIRY, Civil Lines, Betul 460001; Ph: 72; Prop: Birdichand Gothi (C: 72).

MEHTO DAIRY FARM, PO Shahpur 460440, Dist Betul.

MOSES, E, PO Padhar 460005, Dist Betul; Ph: 83 (B: 1, C: 4).

RAYMOND CEMENT WORKS DAIRY PROJECT, Gopalnagar 495663, Dist Bilaspur; Ph: 4348, 3138 (Bilaspur Off); Mgr: Dr Shyam Zanwar (C: 50).

V N R DAIRY, Vill Gomchi, PO Tendua, via
Tatiband PO, Raipur 492099; Prop:
Narayan Chawda (C: 25).

Maharashtra

- A B C FARMS PVT LTD, 95 Mahatma Gandhi Rd,
Camp, Pune 411001; Ph: 64391; Dir: Sohrab
E Chinoy (B: 10, C: 70).
- ABDUL DAWOOD, Modern Stable, S V Rd,
Jogeshwari (W), Bombay 400060.
- ADARSH DUGDHALAYA PVT LTD, Gopur, Malad (W),
Bombay 400064; Ph: 696014, 691656; Chief
Exec: Rohitbhai Patel (B: 500).
- AGRICULTURAL DAIRY FARM, Bhilawadi.
- AHMED ALIJI & CO, Unit No 19, Aarey Milk
Colony, Goregaon (E), Bombay 400065;
Prop: Naudolia Ahmed Aliji (B: 100).
- AHMEDBHAI MEMONJI, Pelhar, Tq Vasai, Dist
Thane.
- AJAY DAIRY, Hirapur Rd, Chalisgaon 424101.
- ANUPAM DAIRY FARM, Jivlapada, Opp Bhor
Industries, National Highway, Borivili
(E), Bombay 400066; Ph: 664124; Chief
Exec: Kurbanali Vali Momin (B: 150).
- ANVIKAR KUMAR, Anji 442103, Dist Aurangabad
(Strength: 20).
- APTE, RAVINDRA, Uttur 416220, Tq Ajara,
Dist Kolhapur (Strength: 18).
- ARUN PARADKAR DAIRY FARM, Baramati 413102,
Dist Pune (C: 70).
- BACHCHE, PANDURANG DHYANU, Vill & PO Bachche
Sawarde, Tq Panhali, Dist Kolhapur (B: 1,
C: 2).
- BAJAJ, SMT REKHA S, c/o C K Bajaj, IOC Dealer,
Station Rd, Chalisgaon, Dist Jalgaon.
- BASNIWALA DAIRY, Bail Bazar, Kurla, Bombay
400070; Prop: Gulam Mustafa.
- BHAJANSONS CATTLE FARM, 60 Daulat Nagar,
Borivili (E), Bombay 400066; Ph: 664252,
661747, 661877; Chief Exec: Shyamlal
Bhajanlal Khatri (B: 900).
- BHALE CATTLE BREEDING FARM, Aundh, Pune;
Chief Exec: Yeshwant S Bhale (C: 65).
- BHANDARI FARMS PVT LTD, PO Pimpri 431213,
Tq & Dist Aurangabad; Ph: 21, 31; Mg
Dir: Rajendra S Bhandari (B: 5, C: 35).
- BHANDE, ARUN TATOBA, Vill & PO Malgaon
416407, Tq Miraj, Dist Sangli.
- BHONGALE, APPASAHEB, Baramati 413102, Dist
Pune (C: 100).
- BOMBAY GOWRAKSHAK MANDLI DAIRY FARM, Akurli
Rd, Kandivli (E), Bombay 400101; Supdt:
Dr B C Dave (C: 150).
- BOMBAY MILK PRODUCERS' ASSOCIATION, Hanjer
Cinema Bldg, S V Rd, Jogeshwari (W),
Bombay 400102; Ph: 622473; Pres: Ebrahim-
hai Essa; Vice-Pres: Rohitbhai C Patel,
Hon Sec: Valibhai P Maredia.
- BORAWAKE DAIRY FARM, Borawake Wasti, Phal-
tan- Baramati Rd, Phaltan 415523, Dist
Satara; Ph: 332; Prop: Vasantao K
Borawake (B: 3, C: 21).
- BORWAKE, BHAGAWANRAO, Akulj 413101, Dist
Solapur (Strength: 15).
- CHATRAVEL AGRICULTURAL & DAIRY FARM, At &
PO Panchwad, Tq Wari, Dist Satara; Ph:
38 (Bhujnj Ex); Prop: Sanjay Patwardhan
(B: 74, C: 4).
- CHITALE AGRICULTURE & DAIRY FARM, Bhilawadi
416303, Tq Tasgaon, Dist Sangli; Ph: 49
(Tasgaon); Prop: B G Chitale (Strength: 100).
- CHITALWALA STABLES, Kurla-Andheri Rd, Jari-
mari, PO Saki Naka, Bombay 400072; Chief
Exec: Ismailbhai Chitalwala (B: 150).
- CHOWDE MAHARAJ GOWRADHAN SANSTHA, At & PO
Wai, Panchgani 412805, Dist Satara.
- D S PATEL DAIRY FARM, 304 Asra Bldg, Opp P
P Pondya's Hospital, Sodawala Lane, Bori-
vili (W), Bombay 400092; Ph: 652985;
Chief Exec: Vinodbhai Patel (B: 300).
- DAIRY OWNERS' LEAGUE COOPERATIVE SOCIETY LTD
(DOLCOS Ltd), 81/2 S V Rd, Jogeshwari (W),
Bombay 400102; Ph: 574202, 575368, 623149;
Chmn: B C Patel; Hon Sec: K V Momin; Hon
Treasurer: Noormohamed Mamji; Mg Cttee
Mems: Dinshaw Nariman, Naval Nariman,
Haji Issa Moosa, Arjunsingh Zandasinh,
Ibrahim K Patel, Durga Indrabhadur Singh;
Gen Mgr: S R Vaidya.
- DAIRYLAND, Nariman Nagar, Varvada Post,
Talasari 401606, Dist Thane; Ph: 52, 78
(Talasari Ex), Off: 313633/4 (c/o Parsi
Dairy Farm, Bombay); Farm Mgr: Ajit D
Mohite; Incharge: R D Patel (B: 252,
C: 225).
- DATTATRAYA, SURDIKAR RAVINDRA, PO Mangrul
(Pan) 413232, Tq Akkalkote, Dist Solapur;
Ph: 6356 (B: 4, C: 5).
- DESHRATH, SHIVAJI, Kurkute, Vill Pimpalgaon,
Tq Ambegaon, Dist Pune.
- DUDHEDIYA DAIRY FARM PVT LTD, Shivaji Rd,
PB No 35, Shrirampur 413709, Dist Ahmed-
nagar; Ph: 2636; Chmn: S M Dudhediya
(C: 45).
- DURGA DAIRY FARM, Vishwanath Stable, Walbhat
Rd, Goregaon (E), Bombay 400065; Prop:
Ramprakash Batra.
- EBRAHIM ESSA, Essa Aziz Stable, S V Rd,
Jogeshwari (W), Bombay 400102; Prop:
Ebrahimbhai Essa.

FIRODIA, M K, Shoba Sadan, Aurangabad Rd, Ahmednagar.

GAIKWAD, ANNA BABURAO, Yeshwantnagar, Dist Solapur (Strength: 10).

GANDHI, MOTILAL, Bidar, Tq Dahiwadi 425438, Dist Satara (Strength: 125).

GAUTAMBAUG, Baramati 413102; Ph: 371; Prop: Arvind G Doshi (B: 30, C: 5).

GARMALKAR, ASHISH, At & PO Shrirampur, Tq Malshiras, Dist Solapur

GHOLAP, SUKHDEO B, Uddat, Tq Indapur, Dist Pune (C: 100).

GIRIVANVASI PRAGATI MANDAL, Fasalbhai Bldg, M G Rd, Fort, Bombay 400023.

GULAM RASOOL NASIRUDDIN, Madina Manzil, S V Rd, Goregaon (W), Bombay 400062; Prop: Kifayatullah.

H S BHOSALE DAIRY FARM, Bhosalewadi 413715, PO Belapur, Tq Shrirampur, Dist Ahmednagar; Ph: 2362 -- Pratap Bhosale (C:50).

HAJI ESSA MANU, Sonapurgali, Agra Rd, Kurla, Bombay 400070; Prop: Haji Sardar.

HAJI UMAR MEMONJI, Essa Stable, Upper, S V Rd, Jogeshwari (W), Bombay 400060.

HAJI USMAN & SONS, East Stable, Lower, S V Rd, Jogeshwari (W), Bombay 400102; Prop: Sardar Haji Usman (B: 1,200).

HONESTY DAIRY FARM, Dattpada Dongri, Borivili (E), Bombay 400066; Ph: 663763; Mgr: M J Momin (B: 400).

INDRABAHADUR SINGH, Shyam Nagar, Chincholi Rd, Malad (W), Bombay 400064 (B: 200).

INGALE, TUKARAM KESHAVRAO, At Vijaywadi, PO Yeshwantnagar 413118, Dist Solapur (B: 4, C: 13).

ISSA, EBRAHIM HAJI, Issa Aziz Stable, S V Rd, Jogeshwari (W), Bombay 400102; Ph: 572321 (B: 150).

JADHAV, SHANKARRAO ANANDRAO, At & PO Late 412103, Tq Baramati, Dist Pune (C: 6).

JAGTAP, RAMESH KESHAVRAO, Vill & PO Pandhare 413110, Tq Baramati, Dist Pune.

JAGTAP, SHIVAJI GANPATIRAO, Vill & PO Pandhare 413110, Tq Baramati, Dist Pune (C: 100).

JAGTAP, SUBHASH, At & PO Pandhare 413110, Tq Baramati, Dist Pune (C: 70).

JANATA COOPERATIVE DAIRY SOCIETY LTD, Kile-dar Stables, Vivekanand Rd, Bombay 400060; Ph: 571192.

JANATA DAIRY FARM, Tara Bhawan, Juhu Club Rd, Bombay 400055; Ph: 6128377.

JANTA DAIRY FARM, Anwari Terrace, New Prabhadevi Rd, Bombay 400025; Ph: 4223944.

JOSHI, SUBHASH, Karad 415110, Dist Satara (Strength: 25).

JOSHI, SUDHIR, At Post Raja 403720, Pimpri, Dist Aurangabad (Strength: 20).

KADIWALA, NOORMOHAMED MAMJI, D-4 Ali-Abad Coop Housing Soc Ltd, Mehar Baug, S V Rd, Jogeshwari (W), Bombay 400102(B:50).

KADWI, IBRAHIM YUSUF, Chunawala Stable, S V Rd, Jogeshwari (W), Bombay 400102; Ph: 623375 (B: 90).

KAMAL DAIRY FARM, Lahoti Compound, Dayaram Rd, Latur 413512; Ph: 2021; Ptnr: Govindkumar N Lahoti, Ph (resi): 2211 (C: 36).

KAMDHENU DAIRY FARM, Satwaichi Wadi, PO Malwadi, Tq Baglan, Dist Nasik; Ph: 82 PP (Devla Ex); Prop: Pandharinath Tukaram Medhane (B: 2, C: 2).

KANTHARIA DAIRY & AGRICULTURE FARM, Kantharia Mahal, 2nd Floor, L B S Marg, Opp Mukund Iron & Steel Co, Bombay 400070; Ph: 5121331; Chief Exec: Yusuf Kantharia (B: 300).

KANTHARIA DAIRY & CATTLE FARM, Kantharia Terrace, Jarimari, M Vasanji Rd, Kurla, Bombay 400072; Ph: 5127324; Chief Exec: Ismail Kantharia (B: 150).

KANTHARIA DAIRY FARM, Vill Bapone, PO Koman, Tq Bassein, Dist Thane; Chief Exec: Ibrahim Kantharia (B: 275).

KARJAGAR DAIRY FARM, Miraj 416410, Dist Sangli (Strength: 7).

KHALIWALA DAIRY FARM, Unit No 1, Aarey Milk Colony, Bombay 400065; Ph: 691197; Prop: Dawoodbhai Jalal Khaliwala (Strength:105).

KHANDE, DILIP MARUTIRAO, At & PO Kolhar, Tq Shrirampur 413710, Dist Ahmednagar.

KHARDE, APPASAHEB, At & PO Kolhar, Tq Shrirampur 413710, Dist Ahmednagar.

KHOT, UTTAM RAMCHANDRA, Vill Manikwadi, PO Peth 415407, Dist Sangli.

KOTE, YADAVRAO BABURAO, 'Guru-Sawli', At & PO Shirdi (Saibaba), Tq Kopergaon 423601, Dist Ahmednagar (B: 5, C: 40).

KULSUM DAIRY FARM, Dhobi Ghat, S V Rd, Jogeshwari (W), Bombay 400102; Prop: Kasambhai.

KUNKULAI, ZUMBARLAL U, Kolhar Bk, Tq Shrirampur 413710, Dist Ahmednagar.

KURANDE, BAJRANG SHYAM, Vill Sonawadi, PO Porali, Dist Satara.

LATUR GO RAKSHAK SANSTHA, c/o Bhartiya Krishi Udyog Pratisthan, Urli-Kanchan 412202, Dist Pune (C: 50).

MAGAR DAIRY FARM, Hadapsar, Pune 411028 -- Satish Magar.

MAGDUM, SHRIKANT VASANT, At & PO Malgaon 416407, Tq Miraj, Dist Sangli (B: 1, C:2).

MAHAJAN, SHRAWAN PANDU, Vill & PO Rand, Tq Sinkheda 425406, Dist Dhule.

MAHARASHTRA DAIRY FARM, Unit No 29, Aarey Milk Colony, Bombay 400065; Ph: 682524.

MAHARASHTRA DAIRY & AGRICULTURE FARM, Behind Ranga Off, Gokhivara, Tq Vasai (E), Dist Thana; Ph: 296; Chief Exec: Haji Issa-bhai Moosabhai, Ph (resi): 661202 (Bby) (B: 250).

MAMONJI, HAJI UMAR, c/o Issa Aziz's Stable, Upper, S V Rd, Jogeshwari (W), Bombay 400060 (B: 250).

MANE, DINAKARRAO, Yeshwantnagar, Dist Solapur (Strength: 20).

MANTHAN DAIRY FARM, Miraj-Sangli Rd, Miraj 416410 (Strength: 10).

MAREDDIA, VALIBHAI PEERJI, D/2 Ali-Abad Coop Housing Soc Ltd, Mehar Baug, S V Rd, Jogeshwari (W), Bombay 400102; Ph: 621552 (B: 250).

MOHD IQBAL H USMAN, Issa Aziz Stable, S V Rd, Bombay 400102; Ph: 571976 (B: 130).

NASIK PANCHAVATI PANJRAPOL, Nasik 422003; Ph: 74007; Mg Trustee: Ramji Pragji Zaveri (Strength: 1,600).

NATIONAL DAIRY & CATTLE FARM, P L Patel Stable, Old Nagardas Rd, Andheri (E), Bombay 400069; Prop: Jasubhai Patel, Ph: 358377, 362247 (B: 200).

NAUGORI DAIRY FARM, Dahisar Check Naka, Dahisar 400068, Dist Thane; Prop: Abdul Wahidbhai.

NEW AZAD DAIRY, Shivnath Stable, Opp National Park, Borivili (E), Bombay 400066; Prop: Noorabhai (B: 150).

OM DAIRY FARM, Miraj 416410, Dist Sangli (Strength: 25).

PANJARPOLE GORAKSHAN SANSTHA, Azangam Rd, Ahmednagar — S M Dungarwala.

PARAMOUNT COOPERATIVE DAIRY SOCIETY LTD, Walbhatt Rd, Sharma Stable, Goregaon (E), Bombay 400065.

PATEL, BABARBHAI C, c/o P L Patel Stable, Opp Usha Talkies, Old Nagardas Rd, Andheri (E), Bombay 400069; Ph: 6301602 (B: 250).

PATEL BROTHERS DAIRY FARM, Moosa Bldg (52) Milk Shop, Tankpakhadi St, Agripada, Bombay 400011; Ph: 391953; Prop: Mehmood Valli Patel (B: 100, C: 20).

PATEL, D S, 304 Asra Bldg, Sodawala Lane, Borivili (W), Bombay 400092 (B: 400).

PATEL DAIRY FARM, Bharucha Stable, Saki Naka, Kurla, Bombay 400070; Prop: Hajrat Ali.

PATIL, ANANDRAO, Chuye, Dist Kolhapur (Strength: 15).

PATIL, BALU PANDU, Natoli, Tq Shirala 415408, Dist Sangli (Strength: 10).

PATIL, MADANSINH MOHITE, Yeshwantnagar, Dist Solapur (Strength: 150).

PATIL, SMT SINDHUTAI, At & Post Loni 450334, Tq Shrirampur, Dist Ahmednagar.

PATRICHIA DAIRY FARM, Lonavla, Dist Pune; Prop: Carvalho.

PAWAR, AJITSINGH, Katechiwadi, Baramati 413102, Dist Pune (Strength: 25).

PAWAR, RAJENDRA A, At & PO Katewadi, Baramati 413102, Dist Pune (Strength: 30).

PEOPLE'S COOPERATIVE SOCIETY LTD, Dahisar 400068, Dist Thane.

PRAKASH DUGHDALAYA, Devi Pada, Near Khatau Mills Compound, Express Highway, Borivili (E), Bombay 400092; Ph: 663610 (B: 150).

PURAV DAIRY FARM, I-B Patel Rd, Goregaon (E), Bombay 400065; Prop: H N Purav.

RADIUM COOPERATIVE DAIRY SOCIETY LTD, Shreyas Ciny, Aarey Rd, Goregaon (E), Bombay 400063; Ph: 694974.

RAMESH GARWARE FARM, NDA Rd, Khadakvasala, Pune 411023; Ph: 33922, 30747 — Malti Soman (C: 42).

RAMWADI DAIRY AGRICULTURAL FARM, Dombivli (E), Dist Thane (B: 100).

RIPON DAIRY FARM, 175 Vivekanand Rd, Jogeshwari (W), Bombay 400102; Ph: 578615; Chief Exec: Hamid Haji Yusuf Agloria (B: 250).

SAGAR DAIRY FARM, Vasant Nivas, Senapati Bapat Marg, Dadar, Bombay 400028; Ph: 4223149; Ptnr: N C Shah.

SALIA, ALLAUDDIN VALIMOHAMED, Unit No 15, Aarey Milk Colony, Bombay 400065; Ph: 626951 (Strength: 110).

SALUNKE, SAKADAR YASHWANTI, Vill Nadre, Tq Miraj 416410, Dist Sangli.

SAMANT, SUDHAKAR Y, c/o Samant & Sons, 133, S V Rd, Jogeshwari (W), Bombay 400102 (B: 100).

SATPUTE, RAMCHANDRA SHANKAR, Bilashi 415402, Tq Shirala, Dist Sangli.

SHAH, B D, c/o Dharamshi Nanshi Stable, 100 (3) Rashmi, Sahakar Rd, Jogeshwari (W), Bombay 400102; Ph: 629598 (B: 100).

SHETYE, PILU PARISA, Katarwadi, Tq Walva, Dist Sangli.

SHINDE, BABAN PATILBA, At & PO Awasari Khurd 412405, Tq Ambegaon, Dist Pune (C: 13).

SHINDE DAIRY FARM, Kolhar Bk, Tq Shrirampur, Dist Ahmednagar; Ph: 44; Prop: Ashok A Shinde (C: 70).

SHINDE, SMT PADMADEVI, Mhaisal 416409, Dist Sangli (Strength: 15).

SHINDE, SHIVAJI SHAMRAO, At & PO Bhodani, Tq Indapur 413106, Dist Solapur (Strength: 15).

SHIVRATNA DAIRY FARM, At Shankarnagar (Akluj), PO Yeshwantnagar 413118, Tq Malshiras,

Dist Sholapur; Ph: 380; Prop: Madansingh Shankarrao Mohite-Patil (B: 9, C: 35).

SHRIRAM MILK DAIRY, At & PO Pimpalgaon (Khadki), Tq Ambegaon, Dist Pune; Ph: Manchar 66 (C: 6).

SULEMAN JANMOHAMED & CO, Madina Manzil, Goregaon (W), Bombay 400062; Ph: 683740; Chief Exec: Suleman Salah (B: 120).

TANNY DAIRY FOODS PVT LTD, 4 Neha Apts, 5 J P Rd, Seven Bunglow, Andheri, Bombay 400058; Ph: 358708; Chmn: N G Bookwala.

TEKAWADE, BHAUSAHEB, At & PO Valadgaon, Tq Shrirampur, Dist Ahmednagar.

TENDULKAR DAIRY FARM, Tendoli, Kudal 416520, Dist Sindhudurg; Ph: 39; Prop: M R Tendulkar (C: 16).

UNITED DAIRY FARM, Chandravarkar Lane, Bori-vili (W), Bombay 400092; Ph: 661176; Chief Exec: Habib Vazir (B: 300).

UNITED DAIRIES, Arya House, S V Rd, Bombay 400050; Ph: 532340.

UTTAM KHOT AGRICULTURE & DAIRY FARM, At Manikwadi, PO Peth, Tq Walwa, Dist Sangli; Prop: Uttam Ramchandra Khot (B: 4, C: 4).

V R FARMS, India House No 2, Kemp's Corner, Bombay 400036.

VALI RASUL KHARAJIA, Boriwala Stable, Oshiwara Bridge, Jogeshwari (W), Bombay 400060; Prop: Valibhai.

VORA, KANTILAL CHHAGANLAL, Yeshwantnagar, Dist Solapur (Strength: 15).

VRINDAVAN DAIRY FARM, At & PO Khutbav, Tq Daund, Dist Pune; Ph: 44; Chief Exec: Annasaheb Grime (B: 150, C: 50).

YADAV, BALVANT MAHIPATI, At & PO Savarde (Bachhe), Tq Panhala, Dist Kolhapur (B: 1, C: 3).

Orissa

SAIROM DAIRY FARM, Khapurja, Madhupatna — Rashabihari Das.

UTKAL POULTRY & DAIRY FARM, Utkal Ashram Rd, Berhampur 760001 — Smt Abha Ghose.

Pondicherry

GLORIA LAND, Sri Aurobindo Ashram, Pondicherry 605002; Ph: Villianur 37; Farm Mgr: Manindra Pal; Incharge, Dairy Section: Ashok Kundu (C: 80, H: 150).

LAKE ESTATE, Sri Aurobindo Ashram, Pondicherry 605002; Ph: Villianur 47; Mg Dir: L J Allan (C: 62).

Punjab

ARJUN SINGH, Rani Bazar, Gole Masjid, Sharikpura, Amritsar.

BACCHAN SINGH, EB/133 Kazi Mohalla, Jalandhar City; Ph: 78525 (B: 90, C: 50).

BALDEV SINGH, Gali No 4, Sundernagar, Amritsar.

BATH DAIRY FARM, Garhi Baksha, 945 Garha Rd, Near General Bus Stand, Jalandhar — Sewa Singh Bath (B: 5, C: 6).

BAWA DAIRY, Chowk Hussianpura, Amritsar — Banta Ram.

BHAGWAN SINGH, Attari 143108, Dist Amritsar.

BHAI BALA DAIRY FARM, Vill & PO Dad (Pakhowal Rd), Dist Ludhiana; Prop: Nazir Singh Grewal (B: 7, C: 2).

BHARPUR SINGH, Vill & PO Jallah, Dist Ludhiana.

BRAR DAIRY FARM, Vill & PO Mahla Kalan, Dist Faridkot; Ph: Mudki-36; Prop: Tek Singh Brar (B: 16, C: 15).

DARSHAN SINGH NAMBARDA, Vill Tajpur Bet, PO Khasi Kalan, Dist Ludhiana.

DAYAL FARMS, PO Kaurian 148030, Dist Sangrur; Prop: Brig Jaswant Singh (retd), Ph (resi): 28973 (Chandigarh) (B: 9, C: 87).

DEKAY DAIRY FARM, Vill Alohran Khurd, Nabha 147201, Dist Patiala; Prop: Darshan Singh.

DHILLON FARM, Kot Kapura 151204, Dist Faridkot; Prop: Gurcharan Singh Dhillon (B: 6, C: 22).

DIDAR SINGH, Mohalla Maodhvapura, Jalandhar City 144001 (B: 200).

GILL, HARDYAL SINGH, Vill & PO Sudhar, Dist Ludhiana.

GILL, JAGDEV SINGH, Vill Tajpur Bet, PO Khasi Kalan, Ludhiana.

GILL, NARANJAN SINGH, Vill & PO Dhamot Kalan, Dist Ludhiana.

GILL, SUKHDEV SINGH, Vill & PO Thamanwal, Dist Jalandhar.

GILLCO DAIRIES (INDIA), Vill Tajpur Bet, PO Khassi Kalan, Dist Ludhiana; Ph: 31916; Prop: Jagdev Singh Tajpuri (B: 3, C: 45, H: 36).

GREWAL, ISHAR SINGH, Vill Barewal, Via Badowal, Ludhiana.

GURDIP SINGH, Vill & PO Khusropur, Dist Jalandhar.

GURDEEP SINGH, Chmn, Land Mortgage Bank, Vill & PO Pholriwal, Jalandhar Dist (B: 50).

GURDEV SINGH, Vill & PO Khokh, Via Nabha 147201, Dist Patiala (Strength: 60).
 HARBANS LAL, Inside Saidan Gate, Jalandhar City 144001 (B: 85, C: 90).
 HARBANS SINGH PEHALWAN, Vill Raipur Dabba, PO Banga 144505, Dist Jalandhar (B: 70, C: 30).
 HARGOBIND STUD & LIVESTOCK FARM, Sarai Nanga, PO Bariwala 152025, Dist Faridkot; Ph: Muktsar 50, Kotkapura 710; Ptnr: A K S Brar (C: 50).
 JASWANT SINGH, Vill Bimbri, Near Bagrian, Sangrur (Strength: 60).
 JAYA DAIRY FARM, New Moti Bagh Palace, Patiala 147001; Ph: 74508; Mgr: Gurmail Singh (C: 47).
 K C BREEDING FARMS, Vill Khusropur, PO Jalandhar Cantt 144005; Ph: 8368; Prop: Gurdip Singh (C: 60, H: 30).
 KHALSA DAIRY FARM, Vill & PO Talanian, Teh Sirbir, Dist Patiala — Mahanbir Singh Bath (B: 5, C: 16).
 KHALSA DAIRY FARM, Vill Alohran Khurd, PO Nabha 147201, Dist Patiala; Ph: 313; Prop: Darshan Singh (B: 5, C: 25).
 KISSAN DAIRY FARM, Vill & PO Kaddon, Dist Ludhiana; Prop: Sukhdev Singh, s/o Nahar Singh (B: 4, C: 11).
 KULDIP SINGH, Vill Paheri, Near Bhadson, Patiala Dist (Strength: 100).
 KULDIP SINGH, Vill & PO Gunia Majra, Near Bassi Pathana, Patiala Dist (Strength: 60).
 KULDIP SINGH BATH, Vill Talanian, Teh Sirhind, Dist Patiala (Strength: 100).
 KULWANT SINGH, Kishan Nagar, Amritsar.
 MAGGAI SINGH, Vill & PO Khokh, Teh Nabha, Patiala (Strength: 60).
 MOHINDER SINGH AJMER SINGH, Vill Faggan Majra, PO Challela, Dist Patiala (B: 8, C: 60).
 MOHINDER SINGH DAIRY FARM, Vill & PO Hasanmunda, Via Kartarpur, Teh & Dist Jalandhar; Ph: 92.
 MOHINDRA DAIRY FARM, Moti Bagh, Patiala 147001 — Amarinder Singh (C: 80).
 MULAQ SINGH, Muslimganj, Tilak Nagar, Amritsar.
 PRITAM SINGH, Vill Kother Jiwe, Teh Jagraon, Dist Ludhiana (B: 30, C: 24).
 PRITAM SINGH CHEDDHA, Raina Bazar, Jalandhar (B: 170, C: 40).
 RACHPAL SINGH, s/o Attar Singh, Vill Jalla, PO Payal, Dist Ludhiana.
 RAI, HARCHARAN SINGH, Vill Khusropur, PO Jalandhar Cantt 144005.
 RAKHRA FARMS, Rakhra, Patiala — Jagdish Singh (Strength: 100).

RANDHIR SINGH, Vill & PO Rode, Teh Moga, Dist Faridkot (C: 25).
 RANDHIR SINGH CHEEMA, Karimpura, Dist Patiala (Strength: 25).
 RANJIT SINGH, Vill & PO Kadon, Dist Ludhiana.
 RANJIT SINGH, Vill & PO Kotha Jiva, Near Jagraon 142028, Dist Ludhiana.
 RATTAN DAIRY FARM, Vill Shahpur, PO Payal 141416, Dist Ludhiana — Harminder Singh.
 RATTAN SINGH, Vill & PO Jugiana Kanganwal, Via Sahrewal, Teh & Dist Ludhiana.
 SANDHU, GURCHARAN SINCH, Vill & PO Nurpur Hakiman, Dist Ferozepur (B: 12).
 SANDHU, SUKHDEV SINGH, Vill & PO Manuke, Teh Jagraon, Dist Ludhiana.
 SARDAR SINGH, Near Jhaydewala Peer, Basti Nay, Jalandhar City 144001 (B:70,C:100).
 SARWAN SINGH (DAIRYWALA), Putlighar Chowk, Amritsar 143001.
 SARWAN SINGH, Vill Kokri Haran, PO Kokri Kalan, Teh Moga, Dist Faridkot (B:2,C:14).
 SIBHARPUR SINGH, s/o Ranjit Singh, Vill Jalla, PO Payal, Dist Ludhiana.
 SUCHA SINGH, Gali No 3, Sundernagar, Amritsar.
 SUKHDEV SINGH, Vill & PO Mehldi, Via Phagwara 144401, Dist Jalandhar.
 SUKHDEV SINGH, Vill & PO Thaman Wal, Near Bilga, Jalandhar.
 SURINDER PAL SINGH, Vill & PO Thaman Wal, Near Bilga, Dist Jalandhar.
 TARLOK SINGH, Shivala Rd, Hussianpura, Amritsar.
 TONY DAIRY FARM, c/o Chadha Silk Store, Ruiui Bazar, Jalandhar City; Ph: 75614; Ptnr: Joginder Chadha (B: 240, C: 40).
 WAZIR SINGH, Sarpanch, Vill Galoli, Near Khanouri, Sangrur 148001 (Strength: 60).
 YASH BHATIA, Shastri Chowk, Jalandhar 144001 (B: 60, C: 40).

Rajasthan

CHOWDHARY DAIRY FARM, Opp Water Filter Plant, Foy Sagar Rd, Ajmer 305001; Prop: Jawri Lal Chowdhary; Ph: 21826 PP (B: 4, C:60).
 DOSAYA DAIRY FARM, Mundri Mohalla, Ajmer 305001; Ph: 22168; Prop: Lal Chand Dosaya (C: 30).
 HANUMAN DAIRY FARM, Shri Malv Jee Ki Haveli, Udaipur 313001; Prop: Basanti Lal (C:50).
 JHALA, J S, 3 Sardarpura, Udaipur 313001 (C: 20).
 JODHPUR DAIRY FARM, Bhopalpura, Udaipur; Prop: Mohan Lal (C: 50).
 JYOTI DAIRY, 282-283 Shastri Nagar, Ajmer

305001; Prop: Mohan Maharaj (C: 40).
 KASHYAP DAIRY FARM, Vaishali Nagar, Anasagar Circular Rd, Ajmer 305001; Prop: Prabhu Dayal Kashyap; Ph: 20980 (B: 8, C: 66).
 KHANDELWAL DAIRY FARM, Opp Vishram Sathal, Pushkar Rd, Ajmer 305001, Ph (resi): 20413 (C: 17).
 PARTHAR DAIRY, Bhopalpura, Udaipur; Prop: Baldev Jee (C: 40).
 RAJASTHAN GOSEWA SANGH, Rani Bazar, Bikaner 334001; Ph: 4749; Gen Sec: Bhanwarlal Kothari. Farms: (i) Anoopgarh; (ii) Bajuwala; (iii) Chhatargarh (Ph: 26); (iv) Hanumangarh; (v) Jaipur (Ph: 73310); (vi) Rawla Mandhi (C: 730).
 RANJIT SINGH, s/o Tara Singh, Mayslink Rd, Ajmer.
 SUGAN CHAND, Shiv Bagh, Ajmer.

Tamil Nadu

A P M DAIRY FARM, 1/96 Azeeza St, Rajachiri 614207, Tq Papanasam; Ph: 191; Mg Ptnr: A Jabbar (B: 2, C: 30).
 BALAKRISHNAN, R, 24 Baker St, Choolai, Madras 600012; Ph: 38138 (B: 20, C: 20).
 BHEL DAIRY FARM, 26/1 Nalli Chetty St, Walajapet 632513, North Arcot Dist; Dir: Dr C B Viswanathan.
 CHETTINAD STUD & AGRICULTURAL FARM, Surapet, Via Sholavaram PO, Madras 600067 -- Dr C G Bhasker.
 CHINNA GOUNDER, K, Uppupalayam, Mallasamudram PO 637503, Dist Salem; Ph: 42 (C: 6).
 CHINNAIYAN, K, Ballakuli, PO Senbakamadevi, Via Attayampatty 637501, Dist Salem (B: 9).
 CRESENT DAIRY FARM, Crescent Public School, Vandalur 600048, Chingleput Dist.
 DASAPRAKASH DAIRY FARM, Varagaram, Madras.
 DORAISAMY, K, Ballakuli, PO Senbakamadevi, Via Attayampatty 637501, Dist Salem.
 FARM HOME SERVICES, 29 Police Commissioner Office Rd, Egmore, Madras 600008 -- J Samuel.
 FUTNANI DAIRY FARM, Futnani Chambers, 47 Sembudoss St, Madras 600001; Ph: 22731, 22732, 28825; Mg Ptnr: Madhusudan Futnani (B: 140, C: 150).
 GOKULAM DAIRY FARM, 48 Taylors Rd, Kilpauk, Madras 600010; Ph: 612624, farm: 680782; Prop: B L Ratan (C: 65).
 HARIKRISHNAN, R, 22 A E Koil St, Corporation Colony, Madras 600081.

HEMA FARMS, c/o Hemalands Estate, Semmanatham, Yercaud 636602, Salem Dist; Ph: Nagalur 36; Prop: Smt Hema Dayalan (C: 20).
 J FARM (TAFE), 37, II Main Rd, Indira Nagar, Madras 600020 -- S S Nagarajan.
 JOHN CATTLE FARM, Cascaud Estate, Mylapathi Estate, Yercaud (B: 15, C: 40).
 KARUMUTTU FARMS LTD, Thiagarajar Mills Premises, Kappalur 626715, Madurai Dist.
 KUMARAGIRI CATTLE FARM, PO Dharmapuri 636701 (C: 35).
 KUALITY DAIRY FARM, 12 Vasantham Bldg, Suramangalam Main Rd, Salem 636005 -- Smt Uma Palaniappan.
 LOYOLA COLLEGE DAIRY FARM, Madras 600034; Ph: 476749; Dir: Rev Fr J Inchakal, sj (B: 5, C: 105).
 MSP RAJESH CATTLE FARM, Yercaud 636601 (C: 46).
 MADRAS CHRISTIAN COLLEGE FARM, Tambaram (E), Madras 600059; Ph: 487290; Hon Dir: I M Rodricks (C: 30).
 MANFORT HIGH SCHOOL DAIRY FARM, Yercaud 636601 (C: 51).
 MANICKAM, S, Chettichipalayam, PO Mangalam, Via Attayampatty 637501, Dist Salem.
 MEHTA DAIRY FARM, No 10 Barnaby Rd, Kilpauk, Madras 600010.
 MEHTA, H S, c/o Bapalal & Co, 29 Rattan Bazaar, Madras 600003; Ph: 564396 (C: 5).
 MCORTHY, K, Ballakuli, PO Senbakamadevi, Via Attayampatty 637501, Dist Salem.
 MUTHUSAMY CATTLE FARM, Vincent, Salem 636007 (C: 35).
 NAMBISAN'S DAIRY PVT LTD, No 34, Fourth Cross St, Mandavellipakkam, Madras 600028; Mg Dir: K K Mohan; Tech Dir: K K Viswanathan.
 PATHY DAIRY FARM, Behind New Theatre, Kuniyamuthur PO 641008, Dist Coimbatore.
 PINJARAPOLE DAIRY FARM, Coonoor High Rd, Madras 600011.
 POULTRY & DAIRY FARM, 158 Linghi Chetty St, Madras 600001; Ph: 25351, 26293; Ptnrs: K J Ramaswamy, K J Seetharaman. Farm: Chingleput; Ph: 27.
 R V S DAIRY FARM, Near Santhi Theatre, Peelamedu, Avanashi Rd, Coimbatore 641001 (C: 50).
 RAJA RAJESWARI & CO, Peelamedu, Coimbatore 610004 -- Govindarajulu.
 RAJAN, T S G, 3/125 Sri Nidhi, K Sathanur, Trichy 621021.
 RAJENDRAN FARMS, Rajendra Mills, Salem 636005 (C: 40).
 RAMANUJAM, G, No 63, W Block, Annanagar, Madras 600040.

RETREAT CATTLE FARM, c/o Salesian College, Yercaud 636601 (C: 41).

RUHSA DAIRY FARM, c/o Rural Unit for Health and Social Affairs, Ruhsa PO, Via K V Kuppam 632201, North Arcot Dist; Ph: K V Kuppam 52, 53, 54, Gram: Ruhsa (C: 20, HC: 5).

SAKTI DAIRY FARM, Virudhunagar.

SAMBAMOORTHY, c/o Sowdambika Finance Pvt Ltd, R S Puram, Coimbatore (C: 25).

SAMINATHAN, R, PO Kuttappalayam, Via Muthur 638101, Dist Periyar (C: 10).

SARVA SEVA FARM, Vadugapatty PO 626602, Via Arachalur, Periyar Dist (C: 10).

SARAVANAN, O K, Nanjagoundanpalayam, PO Odathurai, Gobi Tq, Periyar Dist (C: 10).

SENGOTTUVELLAPPAN, 'Pasum Pannai', Unampallampudur, PO Saminathapuram, Periyar Dist (C: 20).

SHERVARAYAN FARM, M S P Plantations, Cauvery Peak, Yercaud 636602, Salem Dist.

SIVAKOZHUNTU, A, s/o Arumuga Mudaliar, PO Pudukkaraipudur, Gobi Tq (C: 10).

SIVASAMY, O K, Nanjagoundanpalayam, PO Odathurai, Gobi Tq, Periyar Dist (C: 10).

SOMASUNDARAM, S P, PO O Sowdhapuram, Via Vennandur, Salem Dist; Ph: 92 (B: 5, C: 5).

SRI AVINASHILINGAM RURAL CENTRE-DAIRY FARM, Vivekanandapuram PO 641113, Karamadai Block, Coimbatore Dist; Ph: Seeliyur 23; Proj Offr: P Muthian Manoharan (C: 26).

SRI DEVI MILK SUPPLY, 135 Salem Rd, Namakkal.

SRI PADMAPRIYA DAIRY, Manappakkam, Via Porur, Madras 602104.

SRI RAMAKRISHNA MISSION VIDYALAYA AGRICULTURAL FARM, Coimbatore 641020; Ph: 89336 (C: 30).

SRIRAMULU, No 5 Buddi Begum St, Thousand Lights, Madras 600086.

THANGAM DAIRY FARM, PO Udayar Patti, Dist Salem (C: 25).

TIRUPUR DAIRY FARM, 15 Sarmiyan Sahib St, Tirupur 638604, Coimbatore Dist; Ph: 20094, farm: 20254; Mg Ptnr: A P Marappan (C: 45, X: 50).

VIJAYARAGHAVALU, V, No 66, Patel Rd, Perambur, Madras 600011.

VIJJIYAN, K, Ballakuli, PO Senbakamadevi, Via Attayampatty 637501, Dist Salem.

VIVEKANNANTHAN, P, New Fair Lands, Salem 636004 (C: 40).

WELLINGTON DAIRY FARM, Wellington, Nilgiris Dist.

WOODLANDS ESTATE, 256 Advaida Ashram Rd, Fairlands, Salem 636016 — S S Mehta.

Uttar Pradesh

AGRAWAL DAIRY FARM, Vikas Nagar, Dehradun 248001 (Strength: 190).

AHUJA DAIRY, 14 Mure Rd, Rajpur, Allahabad (C: 25).

AJAI SINGH, DR, Dandiya, Baheri, Dist Bareilly (B: 4, C: 4).

AMAR NATH, 118/54 Kaushal Puri, Kanpur (B: 150, C: 35).

AMARJEET DAIRY, Gil Colony, Saharanpur 247001 — Amarjeet Singh (Strength: 60).

AMIT DAIRY FARM, Gumarsa House, PO Deoband, Dist Saharanpur; Prop: Ranvir Singh Chaudhary (C: 10).

AMKHERA FARM, PO Pachpera, Baheri, Dist Bareilly; Prop: Ch Mahipal Singh (B: 10, C: 10).

ANANT RAM, 109/227 R N Nagar, Kanpur (B: 25, C: 5).

ARORA DAIRY, 112/291 Swaroop Nagar, Kanpur (B: 125, C: 25).

BAGA SINGH, PO Bhuria, Vill Sigamkhera, Via Kichha 263148, Dist Bareilly (B: 20, C: 10).

BAICHAIM YADAV DAIRY FARM, Alinagar, Gorakhpur 273001 (B: 30, C: 5).

BALI FARMS, PO Kundeshwary 244713, Kashipur, Dist Nainital; Prop: N K Bali (C: 100).

BASUDEV DAIRY FARM, Bindal Rd, Dehradun 248001 (Strength: 300).

BENARAS HINDU UNIVERSITY DAIRY FARM, Varanasi 221001 (C: 160).

BHUNA FARM, PO Baheri 243201, Dist Bareilly — Tara Singh.

BINDRA FARMS, 80 Hardwar Rd, PO IIP, Mohkam-pur, Dehradun 248001; Ph: 25853, Gram: Atma; President: Dr A S Bindra (Strength: 210).

CHAGARI FARM, Baheri 243201, Bareilly — Jai Pal Singh (B: 50, C: 140).

CHAUDHRI FARMS, Bhuria (Baheri), Via Kichha 263148, Bareilly Dist; Ph: 21 (Bhuria Ex); Prop: D M Chaudhri (C: 10, H: 50).

CHULKI FARM, Deowariya 274001, Nainital — Devi Dayal Juneja (B: 40, C: 50).

DANDIA FARM, Vill Dandia Aphayachand, PO Baheri 243201, Dist Bareilly; Prop: Churamani Singh (B: 100, C: 200).

DHARAMVIR SINGH, Vill Dandia Nagla, PO Baheri 243201, Dist Bareilly.

DHILLON, HARCHARAN SINGH, PB No 15, Rudarpur 263153, Dist Nainital.

DILBAGH SINGH, Bajpur, Nainital (B:40, C:155).
 DURGA PAYONIDHI, Suria Kuan, Basharatpur,
 Gorakhpur 273001; Ph: 4905, 4768, Gram:
 Dumet; Prop: Gautam Poddar (Strength:300).
 FAUJI AGRICULTURE FARM, Jhangirabad, Dist
 Bulandshar — Vinod.
 GEETA GOSHALA, c/o Shri Geeta Kutir Tapovan,
 Sapt Sarovar, Haridwar; Ph: 185; Pra-
 bhandhak: Swami Avsheshanand (C: 70).
 GORAKHNATH GAUSHALA, Gorakhpur — Yadav
 (C: 35).
 GOVERNMENT CATTLE BREEDING-CUM-DAIRY FARM,
 Kalsi 248158, Dist Dehradun; Ph: 46;
 Farm Mgr: Dr N P S Verma (C: 102).
 GREEN DAIRY, Rampur Bagh, Bareilly—Jaiswal
 (B: 40, C: 100).
 GURCHARAN SINGH, 118/604 Kaushal Puri,
 Kanpur (B: 72, C: 2).
 HAJI UMAR JAN, Vill & PO Pasandusa, Dist
 Ghaziabad (B: 102).
 HARNAM SINGH, 120/175 Lajpat Nagar, Kanpur
 (B: 70, C: 25).
 HINDUSTAN SUGAR MILLS DAIRY, Golagokarnath,
 Kheri 262802 (C: 40).
 IFFCO DAIRY FARM, Phoolpur 212402, Allaha-
 bad (C: 30).
 INDIAN VETERINARY RESEARCH INSTITUTE DAIRY
 FARM, Izatnagar 243122, Bareilly Dist
 (B: 1,000, C: 1,000).
 JAGAN JERSEY DAIRY FARM, c/o Jagan Textile
 Corpn, Sheetla Ghati, Mathura 281001.
 JAT-FARM, Dandiya, Baheri, Dist Bareilly;
 Prop: Churamani Singh (B: 40, C: 60).
 JUGUL KISHORE JALAN DAIRY FARM, No 10,
 Boring Indl Estate, Gorakhpur (C: 40).
 KAJRI FARM, Khutar 242405, Shahjahanpur --
 Darshan Singh (C: 100).
 KALA DAIRY FARM, Gaushala Rd, Saharanpur
 (Strength: 60).
 KALPTARU AGRITECH, 76-A Agarwal Market,
 Mahavir Chowk, Muzaffarnagar 251001;
 Ph: 5356; Prop: Man Mohan (B: 2).
 KAMDHENU DAIRY & AGRO INDUSTRIES, Bhoota,
 Bareilly — Ram Avtar (B: 30, C: 90).
 KARNAIL SINGH, Gulariya Shukhi, Baheri
 243201, Bareilly Dist (B: 110, C: 180).
 KASHMIRI SINGH, Vill Malkhana, Baheri
 243201, Bareilly Dist (B: 40, C: 100).
 KEWAL KISHORE, 109/243 R K Nagar, Kanpur
 (B: 400, C: 15).
 KHURANA DAIRY, Khurana Market, Naini 211008,
 Allahabad Dist.
 KHURPIYA FARM, Kitehha, Nainital (B:100, C:150).
 KOCHAR FARM, Khutar 242405, Dist Shahjahan-
 pur — Daleep Singh, Mukliyar Singh
 (C: 100).
 KRISHNA DAIRY, Nakha Jungle, Gorakhpur
 (B: 2, C: 23).

KULDEEP SINGH, 118/605 Kaushal Puri, Kanpur
 (B: 70, C: 2).
 LOKE MANILAL, c/o Farookhabad Cold Storage,
 Park Rd, Allahabad (C: 18).
 MAHARAJ SINGH, 111/450 Harsh Nagar, Kanpur
 (B: 35, C: 20).
 MAHAUMAD ILYAS, Vill & PO Pasandua, Dist
 Ghaziabad (B: 130).
 MAHENDRA SINGH, Kathangiri, Via Kichha
 263148, Dist Bareilly (B: 12, C: 6).
 MALIK SINGH, 118/613 Kaushal Puri, Kanpur
 (B: 35, C: 2).
 MANGLI SINGH, Vill Dandia Nagla, PO Baheri
 243201, Dist Bareilly (B: 28, C: 3).
 MANISH DUGHASHALA, c/o Phoolchand & Sons,
 Dharamshala Bazar, Gorakhpur 273001; Ph:
 3965; Prop: Gyan Prakash (B: 8, C: 25).
 MANJEET SINGH, 110/131 R K Nagar, Kanpur
 (B: 100, C: 35).
 MANNA SINGH, 118/72 Kaushal Puri, Kanpur
 (B: 105, C: 20).
 MEHTA, M N, 111/A57 Ashok Nagar, Kanpur
 (B: 50, C: 10).
 MILITARY DAIRY FARM, Bareilly (B: 100,
 C: 200).
 MILITARY FARM, Khuldabad, Allahabad (C:164).
 MOUGEM ALI KHAN, Vill Shahbad, PO Baheri
 243201, Dist Bareilly.
 NAIN SINGH, Dandiya, Baheri, Dist Bareilly
 (B: 6, C: 4).
 NAV TECHNICAL INSTITUTE, Lodipur, Shahjahan-
 pur (B: 100).
 NUR MIAN, Magbara, Kaiserganj, Meerut City
 250002 (B: 100).
 PARMARTH NIKETAN GOWSHALA (Swami Sukhdeva-
 nand Trust), Parmarth Niketan, PO Swarg-
 ashram 249304, Rishikesh; Ph: 23, 253
 (C: 110).
 PHOOLTAL FARMS, Dhanpur Dist (Bijopor) --
 S K Goel.
 PRAKASH DAIRY UDYOG, Vijaya Chowk, Gorakh-
 pur (Strength: 50).
 PRIYAL FARM, Kitehha, Nainital 263001
 (B: 100, C: 200).
 RAJE SINGH, PO Bhuria, Vill Sigankhera, Via
 Kichha 263148, Dist Bareilly (B: 15).
 RAM KRISHNA MISSION DAIRY FARM, Laxa, Vara-
 nasi 221001 — Sushil Jee Maharaj (C:50).
 RAM SUCHIT DAIRY FARM, Dandi, PO Agril Inst,
 Allahabad 211007.
 RANA FARMS, PO Bajpur 262401, Dist Nainital
 — Rana Gurjit.
 RANBIR KAPOOR, Bajpur 262401, Dist Nainital
 (B: 20, C: 75).
 RANI BHAWANI GAWSHALA, PO Kundeshwari,
 Pachhawala, Nainital (B: 100, C: 200).
 RAZANDIR SINGH, Vill Minterpur, PO Richha,
 Dist Bareilly.

REMOUNT DEPOT, Dairy Farm, Saharanpur
247001 (Strength: 30).
SARDAR DAIRY, Shahjahanpur 242001 (B: 100).
SHIV DAYAL SINGH, 111/429 Ashok Nagar,
Kampur (B: 100, C: 25).
SHIVLALPUR FARM, PO Kundeshwari, Dist Naini-
tal — P L Kapoor (C: 150).
SITA RAM DAIRY FARM, Ahiyapur, Allahabad.
SOHAN SINGH, Vill Rouppur, PO Baheri 243201,
Dist Bareilly.
SRI KRISHNA MURTI FOUNDATION DAIRY FARM,
Rajghat, Varanasi (C: 75).
SUBEG SINGH, PO Bhuria, Vill Sigamkhera,
Via Kichha 263148, Dist Bareilly
(B: 20, C: 5).
SUKHDEO SINGH, PO Bhuria, Vill Sigamkhera,
Via Kichha 263148, Dist Bareilly
(B: 10, C: 10).
SUNEJA FARM, Rudrapur 263153, Dist Nainital
— Maj J S Sanghi (B: 20, C: 75).
SURAT FARMS, PO Fauji Colony, Bajpur 262401,
Dist Nainital — M P Singh.
THAPAR DAIRY FARM, PB No 13, Pallia 262902,
Dist Kheri; Prop: Satish Thapar (B: 50,
C: 5).
U P COLLEGE DAIRY, Bhojubeer, Varanasi
Cantt 221002 (C: 44).
VERMA DAIRY, Manfordganj, Allahabad (B: 3, C: 4).
WAHEED, s/o Mageed Magbara, Kaisergunj,
Meerut (B: 110).
YADAV DAIRY, Shahjahanpur — Ram Lal Yadav
(B: 100).
YADAV, RAM CHANDER, Dilejakpur, Gorakhpur
(B: 14, C: 12).
ZULFIKAR ALI KHAN, Ultarsiya, Via Kichha
263148, Dist Bareilly (B: 6, C: 15).

West Bengal

ASFA DAIRY & POULTRY FARM, Imambazar Rd,
Hooghly 712103; Ph: 2844; Prop: Mohsen
Ali Shirazi (B: 11, C: 11).
EXPRESS DAIRY CO LTD, 198 Bhupen Roy Rd,
Calcutta 700034; Ph: 775584, 773515.
LYALLPUR COOPERATIVE DAIRY FARMERS SOCIETY,
Station Rd, Habra, Dist Nadia; Chief
Exec: Vinod Sharma.
MOHAN DAIRY FARM, P N Ghosh St, Purulia.
RAMKRISHNA ASHRAM DAIRY FARM, PO Nimpith
Ashram 743338, Dist 24-Parganas; Ph:
Jayanagar 80, 1; Trg Organiser: Dr K L
Bandopadhyay (B: 2, C: 25, H: 12).
SAINT ALPHONSUS SOCIAL & AGRICULTURAL CEN-
TRE (SASAC), c/o St Alphonsus School,
PO Kurseong 734203, Dist Darjeeling;

Ph: 343, 497; Dir: Rev Fr J M Abraham,
sj (C: 25).

SARBOMANGOLA DAIRY FARM, Bahir Sarbomangola-
para PO, Burdwan 713201; Ph: 2109; Prop:
Mirza Hussien Asfir (B: 15, C: 30).
SHRIMA DAIRY FARM, Roosulpura, Dist Burdwan;
Mg Ptnr: S K Bhattacharya (C: 26).

Late Additions

ANDHRA PRADESH

AVIRNENI JAWAHARLAL, Bapulapadu, Mandalam,
Veleru 521291, Krishna Dist (B: 16, C: 8).
BALKISHAN BADRUKA, 8-1-387 Tolichowki,
Hyderabad 500008; Ph: 31725 (C: 29).
KAMADHENU DAIRY FARM, Debanam St, Achanta
534123, West Godavari Dist — N Venkata-
narayana (Strength: 11).
KOTESWARA RAO, PINNAMANENI, Rudrapaka 521326,
Krishna Dist (C: 20).
MANI KANTA DAIRY FARM, Angallu Post, Kura-
balakota, Madanadalle Tq, Chittoor Dist;
Mgr: S V Rahana Reddy (C: 18).
PARACHURI, RAMA MOHANA RAO, Kosuru 521152,
Krishna Dist; Ph: 45 (Movva) (B: 15).
SRI VENKATESWARA DAIRY FARM, Kottapeta
(Peddabhi), Krishna Dist — V Venkates-
wara Rao (B: 7, C: 17).
SUBBA RAO, PARVATHANENI, Nuzella 521375,
via Angaluru, Dist Krishna (C: 15).
SUBBA RAO, SUNKARA, Patamata, Vijayawada
520006 (C: 15).

BIHAR

SHRI GAUSHALA, Darbhanga 846004.
SHRI GAUSHALA, Jharia 828111, Dist Dhanbad.
SHRI GAUSHALA, Katras, Dist Dhanbad.
SHRI GAUSHALA, Patna City 800008.
SHRI SARAN PINJRAPOLE GAUSHALA, Chhapra.
SHRI SITAMARHI GAUSHALA, Sitamarhi 843301.

GUJARAT

BHAVNAGAR MAHAJAN GAUSHALA, Bhavnagar 364230.
BHUJ PANJRAPOLE, Bhuj 370001.
KUTCH MANDVI PANJRAPOLE & GAUSHALA, Mandvi
389230, Dist Kutch.
LOK BHARTI GAUSHALA, Sanosara 364230, Shihor
Tal, Dist Bhavnagar.
SHRI RANCHHOD RAYJI MANDIR GAUSHALA, Dakor
388225, Tal Thasra, Dist Kheda.

HARYANA

SHREE GAUSHALA TRUST, Bhiwani 125021; Ph:
2529, 2530, 2533; Vice-Pres: Ram Bhajan

Aggarwal, Ph: 2251-2; Hon Mgr: Devki Nandan, Ph: 2540; Sec: Suraj Bhan Bagria.

SHRI ADARSH GURUKAL GAUSHALA, Jhajjar 124103, Dist Rohtak.

SHRI GAUSHALA, Jind 126102.

SHRI GAUSHALA, Sirsa 125055.

SHRI GAUSHALA SOCIETY (REGD), G T Rd, Panipat 132003; Pres: Dalip Singh Arya, Ph: 2360; Mgr: Ram Gopal, Ph (resi): 2775.

KARNATAKA

ASFAQ, SMT, Sakkalwara PO, Bannerghatta Rd, Kanakapura Rd, Bangalore South.

JEFFREY DONNER, Kothamur Rd, Gottigere PO, Bangalore 560083.

RAO, RAVINDRA, "Belle Mane", Kothamur Rd, Kottigere PO, Bangalore 560083.

SONAVALA, Dairy Farmer, 19th Km, Bannerghatta Rd, Bangalore 560083.

VIKRAM, Dairy Farmer, Bilekally Vill, Bannerghatta Rd, Bangalore South.

MADHYA PRADESH

KASTURBAGRAM KRISHI KSHETRA, Kasturba Gandhi National Memorial Trust, Kasturbagram, Indore 452020; Ph: 63148, Gram: Kasturgram; Dir: T G Menon, Ph off & resi: 63148; Mgr: R S Patel, Ph (resi): 60265 (Herd Strength: 148).

SHRI MAHAVIR GAUSHALA, Krishan Kumar Rd, Raipur 492001.

MAHARASHTRA

ALIJI, RAJABALI, Ali-Abad Hsg Coop Soc Ltd, Behram Baugh, S V Rd, Jogeshwari (W), Bombay 400102.

BOMBAY PINJRAPOLE TRUST, Near Bhuleshwar, Bombay 400004.

CHAUDHARI, ULHAS LEELADHAR, At & PO Do-Kathore, Tq Yawal, Dist Jalgaon (Strength: 10).

COW PALACE, At & PO Malinagar 413108, Dist Sholapur; Ph: 280 (Akluj Ex); Prop: Ramesh Ramchandra Gharmalkar (B:3, C:26).

JALAL, EBRAHIM, Madina Manzil, S V Rd, Goregaon (W), Bombay 400062.

KHANDAGIE, MARUTI CHANDU, At & PO Akluj (Malewadi), Tal Malshiras, Dist Sholapur (B: 1, C: 2).

MEMONJI, VALIBHAI, Ali-Abad Hsg Coop Soc Ltd, Behram Baugh, S V Rd, Jogeshwari (W), Bombay 400102.

MOHAMMED, KASSAMBHAI, Ali-Abad Hsg Coop Soc Ltd, Behram Baugh, S V Rd, Jogeshwari (W), Bombay 400102.

MUKHI, N R, Madina Manzil, S V Rd, Goregaon (W), Bombay 400062.

CONTINENTAL ENTERPRISES

ED-135/1, Tagore Garden, New Delhi 110027

Phones: 537904, 5412353, 593050, 593841

Grams: INDUSAIDS, New Delhi 110027

- Manufacturers of Industrial and Dairy Equipment.
- Suppliers of Spares and Replacements.
- Undertake Installation and Commissioning of Plants, Equipment and Pipings.
- Consultation for Sale, Purchase and Operational Requirements of Food and Dairy Equipment Plants.

NIMA DAIRY FARM, At & PO Vivare, Tq Raver, Dist Jalgaon; Ph: 9 (Nimbhora Ex); Prop: Madhavrao R Kulkarni (B: 4, C: 25).

NIRMAL DAIRY, At & PO Akluj, Tal Malshiras, Dist Sholapur; Ph: 154; Prop: Bhagwan R Borawake (B: 7, C: 14).

PATEL, V D, 304-305 Asra R C, Patel Rd, Chandawarkar Lane, Borivali (West), Bombay 400092.

SALEH, SULEMANBHAI J, C-9 Balwa Coop Hsg Soc Ltd, Bombay 400062.

SHRI PINJRAPOLE GORKSHAN SANSTHA, Ahmednagar.

SUBZAALI, JAFFERBHAI, Ali-Abad Hsg Coop Soc Ltd, Behram Baugh, S V Rd, Jogeshwari (W), Bombay 400102.

VAZIR, HABIB, Chandrawarkar Lane, Borivali (W), Bombay 400092.

MEGHALAYA

ADHIKARI, KRISHNA PRASAD, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

DEUKOTA, BHIM LAL, Vill Jorabat, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

DHAKAL, LAXMI PRASAD, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

DHAKAL, SHIV PRASAD, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

KOIRALA, PREM NARAYAN, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

POUDEL, GURU PRASAD, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

POUDEL, KESHAV RAJ, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793107, East Khasi Hills Dist (Strength: 36).

POUDEL, THAKUR PRASAD, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist (C: 25).

REGMI, DIRGH NARAYAN, Vill Umsawamai, 11th Miles, G S Rd, PO Jorabat 793102, East Khasi Hills Dist.

PUNJAB

AMRITSAR PINJRAPOLE GAUSHALA (REGD), Ghee Mandi, Amritsar 143006; Ph: 46813; Pres: Surinder Chand Mehra, Ph: 43318; Gen Sec: Manmohan Singhania, Ph: 46401.

BER RAM, Vill & PO Ber Khurd, Dist Ludhiana; Prop: Jagdip Singh (B: 7).

MANN DAIRY FARM, Vill & PO Gurhe, Dist Ludhiana — Mehar Singh (B: 18, C: 4).

RAJASTHAN

CHOTU, s/o Ramaji Jat, Vill & PO Tabiji, Ajmer 305206 (B: 4, C: 4).

GOPAL RAM, s/o Ramrakh Choudhary, Vill Amar Pura Rathamyaya, Pilibanga, Dist Sri Ganganagar (B: 4, C: 6).

HARIYANA DAIRY FARM, Opp Nagar Pareshad, Outside Mathura Gate, Gole Bagh Rd, Bharatpur 321001; Ph: 2153; Prop: Dr. Roop Ram Sharma (B: 1, C: 3).

JALANDHER SINGH, s/o Albel Singh, PO Amar-pura Rathan Doaya, Pilibanga, Dist Sri Ganganagar (B: 5).

RAMPAL JAT, Nagphani-Pushkar Rd, Ajmer (C: 16).

SAMBHU DAIRY FARM, Ward No 8, Anoopgarh 335701—Rewant Ram Sarawat (B: 2, C: 54).

SAPRA, SUNDER LAL, Qr No 521, Tibba Colony, RCP, Suratgarh 335804 (B: 2, C: 1).

SHRI GANGA JUBILEE PINJRAPOLE GAUSHALA, Bikaner 334001.

SHRI GAUSHALA SAMITHI, Hanumangarh Town 335512, Dist Sri Ganganagar.

SHRI GOPAL GAUSHALA, Sujangarh 331507, Churu Dist.

SHRI KRISHNA GAUSHALA, Ramgarh 331024, Sikar Dist.

SHRI LAXAMANGARH PINJRAPOLE, Lachhmangarh 332311, Dist Sikar.

SHRI MURLI MANOHAR GAUSHALA, Bhinasar 334403, Bikaner Dist.

SHRI PINJRAPOLE GAUSHALA, Durgapura, Jaipur.

SHRI RAJGARH JUBILEE PINJRAPOLE GAUSHALA, Sadulpur 331023, Churu Dist.

UTTAR PRADESH

AWADH NARAIN, PO Basaht, Vill Babura, Karchana Block, Dist Allahabad.

DUGDH UTPADAK SAHKAR SAMITI LTD, Vill Makh-dumpur, PO Hastinapur, Dist Meerut; Sec: Gyan Chand (B: 110, C: 5).

JAI SHANKAR PRASAD, Vill Garalla, PO Khai, Dist Allahabad (B: 2, C: 2).

MADHUBAN FARM, Mimalana, Kanugooayan, Deoband 247554, Dist Saharanpur; Ph: 216; Prop: Pankaj Kumar (B: 114, C: 48).

PASHUDHAN FARM, c/o Indian Herbs, PB No 5, Saharanpur 247001; Ph: 7919, 7231, 6497 — Sudhakar Agarwal.

RANBIR SINGH (MASTERJI), Gunarsa House, Rankhandi Rd, Deoband 247554, Dist Saharanpur.

SEWTHA MILK PRODUCERS' SOCIETY LTD, Sewtha, Tilhapur 212218, Dist Allahabad (B: 175, C: 35).

SHRI NAI MANDI GAUSHALA, Muzaffarnagar.

SHRI PINJRAPOLE GAUSHALA, Saharanpur.

SHRIMAD BALLABH GAUSHALA, Gokul, Mathura.



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Asli
BUTTER **Aarey**
BUTTER



Wah, re... Aarey!



Dairy Products
Marketed by



Dairy Product Manufacturers

Listed below are manufacturers/suppliers of dairy products, both Western and indigenous. The basic information is followed by a list of products, including IMF (Infant Milk Food/Baby Food), SMP (Skim Milk Powder) and WMP (Whole Milk Powder), as well as brand names, where available.

ADARSH DUGDHALAYA PVT LTD, 214 Raja Ram Mohan Roy Marg, Bombay 400004; Ph: 356145. Regd Off: Gopur, Marve Rd, Malad, Bombay 400064; Ph: 696014, 691565.

AJANTA DAIRY, 5 Krishna Kunj, Behind Halwai Ki Bagichi, Agra-Mathura Rd, Agra 282002; Ph off: 76100, factory: 66155, Gram: Ajantadery; Mg Partner: K L Agarwal; Partner: Banwari Lal Agarwal. Products: Sterilised milk cream, paneer, flavoured milk. Brand Names: Ajanta, U-Mee.

ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, Lalapet, Hyderabad 500017; Ph: 71851 to 71859, Gram: Apdairy, Tlx: 0155-545; Mg Dir: K Sadasiva Rao, IPS. Milk Product Factories -- Chittoor 517002: Gen Mgr: Dr V Rajagopala Raju, Ph off: 2075, resi: 2071; Inst Cap: 1,50,000 lpd; Hyderabad: Lalapet, -500017; Gen Mgr: Dr V Raghava Rao, Ph off: 703363, resi: 71839; Inst Cap: 1,50,000 lpd; Nandyal 518502: Gen Mgr: Dr V Anjaneyulu, Ph off: 730, resi: 830. Products: Butter, butter milk, cheese, flavoured milk, ghee, ice cream mix powder, IMF, SMP, WMP. Brand Name: Vijaya. (See also Milk Plants).

ARAVALI CHEESE CO (P) LTD, E/6D, DDA Flats, MIG, Mayapuri, New Delhi 110064; Ph: 533808, Gram: Fastfood; Mg Dir: S S Ranawat. Factory: E-64, Sector 8, Noida, Dist Ghaziabad, UP; Ph: 805-3828. Product: Different types of cheese.

ASHISH FOODS PVT LTD, 43-44 Ajit Arcade, Kailash Colony, New Delhi 110048; Ph: 6431505; Exec Dir: Kiran Kumar Arora; Dir: Vijay Juneja, Ph: 234098. Factory: Lawrence Rd, Delhi. Products: Cheese (Herbal, Natural, Processed, Special). Brand Name: Ashish.

ASOOMAL MAGHANMAL KARACHIWALA, 196 Zaveri Pazar, Bombay 400002; Ph: 315876. Factory: Swastik Indl Estate, Senapati Bapat Marg, Bombay 400028; Ph: 4228397. Product: Sweets.

BANASKANTHA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, PB No 20, Palanpur 385001, Gujarat; Ph: 2981/5, Gram: Banasdairy, Tlx: 121-289; Mg Dir: R Saini, Ph (resi): 2322. Products: Butter, ghee, IMF, SMP, WMP. Brand Names: Amul, Sagar. (See also Dairy Cooperatives).

BHAGIRATHI COOPERATIVE MILK PRODUCERS' UNION LTD, 44 Krishnath Rd, Behrampore 742101, Dist Mushirabad, West Bengal; Ph: 898, Gram: Bhagirathi; Gen Mgr: S N Mukherjee. Product: Ghee. Brand Name: Bhagirathi. (See also Dairy Cooperatives).

BHARANI MILK DAIRY, Old Madras Rd, Krishnarajapuram, Bangalore 560036; Ph off: 58698, 33178; Mg Partner: K Ram Gopal. Products: Butter, cheese, curd, ghee, khoa, paneer.

BHIM CHANDRA NAG, 8 Nirmal Chandra St, Calcutta 700012; Ph: 277465, 333378; Partner: Baidya Nath Nag. Product: Sweets.

BIHAR STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, B-9 Srikrishnapuri, Patna 800001; Ph: 24716, Gram: Compfed, Tlx: 022-215; Mg Dir: G S Kang, IAS. Product Factory: Composite Milk Plant, Barauni Dairy, Barauni 851112; Ph: 30, Gram: Compfed; Offr Incharge (Plant): S M Amir; Mgr (Proc): T K Das. Products: Ghee, SMP, WMP. Brand Name: Sudha. (See also Milk Plants).

BIKANER DAIRY SWEETS, Acharya Chowk, Bikaner 334001, Rajasthan; Ph: 4685, Gram: Ghatyson; Mg Partner: D K Acharya, Ph (resi): 4685; Partner: G S Acharya. Factory: Ganga-sahar Rd. Products: Canned sweets, rasgolla, rajbhog, chum-chum, gulabjamun, etc. Brand Name: Denago.

CENTRAL ARECANUT AND COCOA MARKETING AND PROCESSING COOPERATIVE LTD (CAMPCO), Sahakari Mahal, PB No 223, Mangalore 575001; Ph: 22398, Gram: Campco, Tlx: 842-272; Mg Dir: A A Desai; Pres: V S Bhat. Product: Milk Chocolate, etc. See also Late Additions.

See also LATE ADDITIONS at the end of the listing

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CENTRAL DAIRY FARM, Uttar Pradesh Pashudhan Udyog Nigam Limited (A State Govt Undertaking), PO Dairy Farm, Aligarh 202122, Uttar Pradesh; Ph: 3014, 6497, Gram: Pashudyog; Mg Dir: Rajeev Gupta, IAS; Gen Mgr: M D Saksena; Dairy Production Mgr: R K Singh. Branches — Allahabad: 5 Albert Rd, Civil Lines; Ph: 3509; Bareilly; Kanpur: The Mall Rd; Lucknow: 37 Hazratganj; Ph: 45174; Nainital: The Populars; Ph: 128; New Delhi: Tropical Bldgs, Connaught Circus, -110001; Ph: 320628; Ranchi: The Mall. Products: Butter (white/salted), ghee. Brand Name: CDF.

CHANDU HALWAI KARACHIWALA PUNJABI, 185 Wal-keshwar Rd, Bombay 400006; Ph: 8123625, 8124795, 8127095, Factory: Chandu Bhavan, Grant Rd, Bombay 400007; Ph: 372628, 893830. Product: Sweets.

CHITALE BROS, 777 Sadashiv Peth, Poona 411030; Ph off: 443208, Branches: 441990, 57751. Product: Sweets.

COIMBATORE DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, West Sambandam Rd, R S Puram, Coimbatore 641002; Ph: 22389, 35016, Gram: Cocomilk; Chmn: M Natarajan; Mg Dir: M Jesusavarinathan. Products: Flavoured milk, ice cream, palpeda. (See also Dairy Cooperatives).

CUDDAPAH DISTRICT MILK PRODUCERS' COOPERATIVE UNION LTD, Milk Products Factory, Proddutur, AP; Ph: 2853; Gen Mgr: V Ranga Rao. Products: Butter, cheese, ghee, IMP, SMP, WMP. Brand Name: Vijaya. (See also Dairy Cooperatives).



DALMIA DAIRY INDUSTRIES, 11 ABC Atma Ram House, 1 Tolstoy Marg, New Delhi 110001; Ph: 3311035, 3311036, 3311037, 3311038, 3311039, Gram: Dalmiary, Tlx: 031-3673 DDIL IN; Dir: A Dalmia; Exec Dir: I P Singh; Sr Gen Mgr: S K Sarin; Gen Mgr (Works): Dr P K Sabarwal; Mktg Mgr: Gautam Kaul; Mktg Exec: K S Dhingra; Product Exec: D J Singh. Works: Ghana-Sewar By-pass Rd, Bharatpur 321001, Rajasthan; Ph: 3417, 3347, 2056, 2768, 2723, Gram: Dalmiary. Branches — Bombay: 65 Mittal Chambers, Nariman Pt, -400021; Regl Mgr: S Gokran; Calcutta: 12-B Stephen House, 4 BBD Bagh (East), -700001; Regl Mgr: R Roy; Madras: 6A, 'C' Block, 'Anugraha', 19 Nungambakkam High Rd, -600034;

Regl Mgr: S Sukumar; New Delhi: 1E/1 Jhandewalan Extn, -110055; Ph: 770772, 770773, 525722; Regl Mgr: M M Malhotra. Products: Baby Food, Butter, Ghee, SMP, WMP. Brand Names: Infanto, Sapan, Sapan Premium.

DELHI MILK SCHEME, Govt of India, West Patel Nagar, New Delhi 110008; Ph: 588218, Gram: Delmilk; Chmn: Dr Chhatra Sal Singh, IAS, Ph: 585109; Dep Gen Mgr (Tech): M N Khan, Ph: 588159. Products: Butter (white/salted), flavoured milk (sweetened), ghee, yoghurt. Brand Name: DMS. (See also Milk Plants).



DEMPO DAIRY INDUSTRIES LIMITED, Dempo House, Campal, Panjim 403001, Goa; Ph: 3281 to 3287, Gram: Kamadhenu, Tlx: 0194-217 DMPO IN; Chief Exec: Dr A B Prasad; Offr on Spl Duty: S B Joshi; Production Mgr: S K Martin; Milk Proc Mgr: A B Marle. Plant: Vill Asangi, Jamkhandi Tq 587311, Dist Bijapur, Karnataka. Regd Off: Mahalaxmi Chambers, 9/1 Mahatma Gandhi Rd, Bangalore 560001; Ph: 575321, Gram: Dempo-group, Tlx: 845-427 DMPO IN. Sales Offices — Bangalore: Mahalaxmi Chambers, 9/1 M G Rd, -560001; Bombay: Moti Mahal, Jamshedji Tata Rd, Churchgate, -400020; Ph: 221469, Tlx: 11-2522, 11-3954; Goa: Dempo House, Campal, Panjim. Products: Brand Names: Bounce SMP, WMP, Butter; Bouncespray baby food; Pawan pure ghee.

DHARMAPURI DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Krishnagiri 635002, Tamil Nadu; Ph: 437, 487; Chmn: S Aranganathan; Mg Dir: Dr R Solomon. Products: Butter, ghee, SMP. (See also Dairy Cooperatives).

DINSONS (INDIA) PRIVATE LIMITED, S-355 Greater Kailash-II, New Delhi 110048; Ph: 6413253, 6417182; Mg Dir: Mahesh Dhingra. Factory: C-27, Sector VI, Noida, Dist Ghaziabad, UP; Ph: 805-3617, 805-3655. Products: Liquid milk, flavoured milk. Brand Names: Dinson, Zesta.

DOSHI BROTHERS, Mahavir Rd, Off Polson Rd, Anand 388001; Ph: 4031, Gram: Parcream; Partners: R V Doshi, K V Doshi, C V Doshi, Ph (resi): 437, 1752, 645. Product: Casein. Brand Name: 'DB'.

FARMER BROTHERS, Empress Mahal, Khodadad Circle, Bombay 400014; Ph: 458683; Mg Partner: Eruch D Chinoy. Products: Butter, cheese.

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FOOD SPECIALITIES LIMITED, M-5/A Connaught Circus, PB No 611, New Delhi 110001; Ph: 353270, 353570, Gram: Mogalac, Tlx: 31-62765 FSL IN; Mg Dir: F J Ryan; Mktg Mgr: Ranjit Raj; Purchase Mgr: M Balan; Mgr, Corporate Affairs: Ravi Wahi. Factory: Moga, Punjab; Ph: 2601; Head, Extn Dept: T S Sandhu. Products/Brand Names: Lactogen (IMF), Lactogen milk cereal, Milk-maid (sweetened condensed milk), Nespray (full cream powdered milk).

FOREMOST INDUSTRIES (INDIA) LIMITED, Ved Mansion, 72 Janpath, New Delhi 110001; Ph: 352321, 352578, 352625, 352694, Gram: Skimmilk, Tlx: 031-2969 SKIM IN, 031-62221 FDL IN; Chief Gen Mgr (Finance): S N Chandak; Chief Gen Mgr (Works): B M Agarwal; Chief Gen Mgr (Proj): Vipin K Mital; Gen Mgr (Mktg): P Ghosh; Gen Mgr (Finance): K C Jain; Product Mgr: Sunil Puri. Plant: Dehradun Rd, PO Kailashpur, Saharanpur. Branches: Bombay, Calcutta, Guwahati, Madras. Products: IMF, ghee, SMP, WMP. Brand Names: Angel, Indana.

FUN FOODS, No 17, B-2 Shopping Centre, Safdarjung Enclave, New Delhi 110029; Ph: 662944, 677213; Chief Exec: Rajiv Bahl.

GANGURAM & GRANDSONS, 81-B, S P Mukherjee Rd, Calcutta 700026; Ph: 466160. Works: 84/A, S N Pandit St, Calcutta 700020; Ph: 472377. Shop: 11 Chittaranjan Ave, Calcutta 700013; Ph: 238418. Product: Sweets.

GHOSH, G C, Plot 64 (P), Industrial Area, Koker, Ranchi, Bihar. Products: Gulab-jamun, Rasagolla.

GLINDIA LIMITED (formerly Glaxo Laboratories (India) Ltd), Family Products Div, Dr A B Rd, Worli, Bombay 400025; Ph: 4933871, Gram: Glindtels, Tlx: 74410/71279 GLND IN; Vice-Pres Mktg: G S Fernando. Factory: Manzurgarhi, PB No 1, Aligarh 202001; Ph: 4811, 4812, Gram: Glindtels; Factory Mgr: C L Seshadri. Products: Complian, Glucon-D, IMF, Weaning Food (Farex).

GOA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Curti, Ponda 403401, Goa; Ph off: 247, dairy: 92, Gram: Goadairy; Acting Mg Dir: P K Ghate.

GOUR COOPERATIVE MILK PRODUCERS' UNION LTD, Rabindra Bhavan, Malda 732101, West Bengal; Ph: 2292, Gram: Mamul; General Mgr: S Ghosh. Product: Ghee. Brand Name: Mamul.

GUJARAT COOPERATIVE MILK MARKETING FEDERATION LTD (GCMFF), Amul Dairy Rd, Anand 388001; Ph: 3201-4, 3209, Gram: Milkfed, Tlx: 0172-220; Chmn: Dr V Kurien; Mg Dir: J J Baxi, Ph off: 3400, resi: 3888; Gen

Mgr: N H Vyas, Ph (resi): 3872; Asst Gen Mgr (QC): J M Contractor, Ph (resi): 3382; Asst Gen Mgr (T&P): Dr H B Buch, Ph (resi): 3873. Branches — Ahmedabad: Ph: 52101-3; Mgr (Sales): B N Chatterjee, Ph (resi): 449844; Bombay: Ph: 244220, 244269, 244336; Dep Mgr (Sales): V J Matthai; Calcutta: Ph: 434320, 434370; Mgr (Sales): P K Chatterjee; New Delhi: Ph: 3315745, 3315752, 3313462; Mgr (Sales): R C Agarwal; Madras: Ph: 470752, 472820; Mgr (Sales): N Natarajan. Products/Brand Names: Amul (butter, cheese, ghee, milk chocolate, shrikhand, SMP, WMP, UHT milk), Amulspray (IMF), Casein, Cheese powder, Nutramul (malted milk powder), Sagar (butter, ghee, SMP, WMP).

GUJARAT DAIRY DEVELOPMENT CORPORATION LTD, Nigam Bhavan, Sector 16, Gandhinagar 382016; Ph: 22881, Gram: Dairycorp; Mg Dir: G R Biswas, IAS. Milk Plants — Abad Dairy: Kankaria Rd, Ahmedabad 380022; Ph: 54645-49; Gen Mgr: A K Datta; Products: Ghee, Sweets; Bhavnagar Dairy: Gaurishankar Lake Rd, -364002; Ph: 27886, 28554; Sr Mgr: R K Kathpalia; Product: Ghee; Chalala Dairy: Dist Amreli; Ph: 82; Mgr: Y S Malek; Product: Ghee; Gandhinagar Dairy: Sector 25, 'K' Rd, GIDC Estate; Ph: 22877; Dep Mgr: James Joseph; Products: Flavoured milk, ghee; Jamnagar Dairy: Saru Section Rd, -362001; Dep Mgr: V P Khamar; Product: Ghee; Junagadh Dairy: Jaffar Maidan, -362001; Ph: 20478; Mgr: G A Patel; Products: Casein, ghee; Kutch Dairy: Madhapur, Kutch-Bhuj 370020; Ph: 1555; Mgr: Devang Mehta; Products: Cheese, ghee; Rajkot Dairy: Dudhsagar Marg, -360003; Ph: 87353-54; Gen Mgr: G R Ralhan; Sr Mgr: S R Trivedi; Products: Flavoured milk, ghee, sweets, SMP; Surendranagar Dairy: Wadhvan City, -363030; Ph: 1788; Sr Mgr: A M Bhayla; Products: Casein, ghee. (See also Milk Plants).

GUNTUR DISTRICT MILK PRODUCERS' COOPERATIVE UNION LTD, Sangam Dairy, Vadlamudi 522213, AP; Ph: 3711/2/3 (Tenali Ex), Gram: Sangamilk, Tlx: 471-279; Gen Mgr: Dr T Krishna Murthy; Dep Gen Mgr (Plant & Prod): Dr V Ch Subba Rao. Products: Casein, doodhpada, flavoured milk, ghee, butter, SMP, WMP. Brand Name: Vijaya.

H M M LIMITED, 1 Jai Singh Rd, PB No 407, New Delhi 110001; Ph: 311156, Gram: Horlicks, Tlx: 31-66369, 31-3655; Mg Dir: S J Scarff; Vice Pres: D P Dhawan; Mgr (Mfg, Quality Control & Packing Ops): L S Dhillon. Plants — Nabha: Punjab;

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HARYANA DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, SCO No 127-128, Sector 17C, Chandigarh 160017; Ph: 40259, 26624, Gram: Vitality; Mg Dir: G Prasanna Kumar, IAS. Product Factories — Bhiwani: Hansi Rd, -125001; Ph: 2427; Gen Mgr: S K Arora; Jind: Hansi Rd; Ph: 2332; Gen Mgr: D B Rajput; Rohtak: Gohana Rd; Ph: 5919; Project Mgr: Dev Gupta. Products: Butter, casein, condensed milk, flavoured milk, ghee, SMP, WMP. Brand Name: Vita.



HARYANA MILK FOODS LIMITED, 78/3 Janpath, New Delhi 110001; Ph: 310827, 324492, 321392, 324990, 325038, Gram: Madhufood, Tlx: 031-4865 HMF IN; Chmn: Prem K Goyal; Mg Dir: Omesh Kumar Goyal; Mktg Dir: Berjesh K Goyal. Plant: Kaithal Rd, Pehowa, Dist Kurukshetra, Haryana; Ph: 61, Gram: Haryanamilk. Branches — Bombay: 11-13 Calicut St, Fort, -400001; Ph: 264131; Dir: Smt Chandra Prabha Jain; Calcutta: 76 Acharya J C Bose Rd, -700014; Ph: 248336, Gram: Freshmilk; Depot Incharge: Goyal Sadhukhan; Chandigarh: 653 Sector 16D; Ph: 42143. Products: Baby food, butter, ghee, SMP, WMP. Brand Name: Madhu.

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HAUER TRADING CO, Dairy Div, SVN House, 90, C P Ramaswamy Aiyar Rd, Alwarpet, Madras 600018; Ph: 71795, Gram: Potential, Tlx: 041-7385 HAU IN; Mg Ptnr: S V Narasimhan; Executives Incharge: S N Murali, S N Srikanth. Branches — Bombay: 61 Rajat Apartments, Mt Pleasant Rd, Malabar Hill, -400006; Ph: 8129867, 8228205, Gram: Potential; Contact Exec: Y Satyamurthy; Calcutta: 7 Stephen House, 5 Dalhousie Square East, -700001; Ph: 282735, 205344, Gram: Prudence, Tlx: 021-3100; Contact Exec: M Muthu, T R B Manian; New Delhi: 7575 Ram Nagar, -110055; Ph: 731458, 523581; Contact Exec: B P Sharma; Port Blair (Andamans): Aberdeen Bazaar,

-744101; Ph: 2609, Gram: Srikanth; Contact Exec: R M Meyyappan. Products: Butter, cheese, condensed milk (skimmed/full cream), ghee, milk, SMP, WMP.

HEALTHWAYS DAIRY PRODUCTS CO (REGD), 104 East Azad Nagar, Delhi 110051; Ph: 213132; Mg Partners: Raj Kumar Kandhari, Ph (resi): 212751, D R Sharma. City Off: 1665 Kucha Dakhni Rai, Daryaganj, New Delhi 110002; Ph: 277038. Branch: K-52 Connaught Place, New Delhi 110001; Ph: 350114, Gram: Cowsbrand. Factory: Gulaothi, Uttar Pradesh; Ph: 23. Products: Butter, condensed milk, ghee, milk powder, paneer. Brand Names: Cow's brand, Swastik.

HIMALAYAN COOPERATIVE MILK PRODUCERS' UNION LTD, Matigara 734428, Dist Darjeeling, West Bengal; Ph: 22512, 22681 (Siliguri Ex), Gram: Himul, Matigara; Chief Exec Offr: R Mutsuddi. Product: Ghee. Brand Name: Himul.

HINDUSTAN COCOA PRODUCTS LIMITED, Cadbury House, 19 Bhulabhai Desai Rd, PB No 26516, Bombay 400026; Ph: 4920181, 4920530, 4920524, 4920522, Gram: Cadburyind, Tlx: 011-3262; Pres: C Y Paul; Vice Pres (Sales & Mktg): A Lakshmanan. Product: Milk chocolates. Brand Name: Cadburys.

HYDERABAD MILK FOODS & ALLIED PRODUCTS PVT LTD, 239 Mahindra Hills, East Marredpally, Secunderabad 500026; Mg Dir: Dr D Venkayya.

INDODAN INDUSTRIES LIMITED, Ved Mansion, 72 Janpath, New Delhi 110001; Ph: 352321, 352578, 352625, 352694, Gram: Skimmilk, Tlx: 031-2969 SKIM IN, 031-62221 FDL IN; Chief Gen Mgr (Finance): S N Chandak; Chief Gen Mgr (Works): B M Agarwal; Chief Gen Mgr (Proj): Vipin K Mital; Gen Mgr (Mktg): P Ghosh; Gen Mgr (Finance): K C Jain. Plant: Budhana Road, Muzaffarnagar, Uttar Pradesh. Branches: Bombay, Calcutta, Delhi, Guwahati and Madras. Products: Condensed milk (sweetened), milkafe, ghee, SMP, WMP, IMF. Brand Names: Anand, Indana.

JAIN ADARSH DUGDHALAY, 48/52 Bazargate St, Parshwakutir Coop Housing Society Ltd, Ground Floor, Fort, Bombay 400001; Ph: 263510, 261721; Prop: Pankaj Mehta, Ph (resi): 2028768. Products: Basundi, Kulfi, Shrikhand. Brand Name: Jain.

JALGAON JILHA SAHAKARI DUDH UTPADAK SANGH MARYADIT, PB No 32, Near Ernadil Naka, Jalgaon 425001; Ph: 3389, 3924, 4030, 4800, Gram: Dudhvikas, Tlx: 0753-216;



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JAMMU COOPERATIVE MILK FEDERATION LTD, Jammu Cantt, Jammu; Ph: 43176; Mg Dir: Dr C D Vir, Ph (resi): 44149; Processing Offr: H R Gupta; Distribution Offr: R M Dhar; Quality Control Offr: A K Kotha; Mgr (Proc): Dr Jaswant Singh. Products: Flavoured milk and coffee, ghee. Brand Name: Jamfed.

JIWAN MILK & ALLIED SPECIALITIES LIMITED, 78/3 Janpath, New Delhi 110001; Ph: 325047, 350761; Mg Dir: Amar Nath Goyal, Ph (resi): 6442474. Plant: Kotkapura, Punjab; Ph: 325.

K C DAS PRIVATE LIMITED, 3 Rama Krishna Lane, Calcutta 700003; Ph: 554835, 558431, 559043; Dir: N N Das. City Branches: 11 Esplanade East, -700001; Ph: 235920; 117 B C R Avenue, -700007; Ph: 343065. Lab: 575 Rabindra Sarani, -700003; Ph: 557042. Regd Off: 21 Church St, Bangalore 560001; Ph: 55003, Gram: Rassogolla; Dir: B N Das. Products: Chum Chum, gulabjamun, rossogolla, rosomolai, sondesh, yoghurt.

KAIRA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Anand 388001; Ph: 3402, Gram: Amuldairy, Tlx: 0172-208; Mg Dir: V H Shah; Gen Mgr (Comm): J M Shah. Plants: Anand, Mogar. Products/Brand Names: Amul (butter, ghee, chocolates, milk powder, cheese), Amulspray (IMF), Balamul, Casein, Cheese powder, Nutramul.

KANDHAR DAIRIES, 104 East Azad Nagar, Delhi 110051; Ph: 213132; Prop: Raj Kumar Kandhari, Ph (resi): 212751. Branch: Bombay, Ph: 457519. Products: Butter, cream, SMP.

KARNATAKA COOPERATIVE MILK PRODUCERS FEDERATION LIMITED, No 22 Poornima Bldgs, J C Rd, 1st Cross, Bangalore 560027; Ph: 222691, Gram: Nandini; Mg Dir: C Muni-swamy, IAS. Product Factories -- Bangalore Dairy: Hosur Rd, -560029; Ph: 40261, Gram: Mydairy; Dir: Vidyashankar, IAS; Dharwad: Product Dairy, P B Rd, -583004; Ph: 80603; Gen Mgr: R Gopal Reddy, Ph off: 80705, resi: 80380; Gejjalagere: Product Dairy, Dist Mandya; Ph: 118 (Maddur Ex); Gen Mgr: A S Premnath, Ph: 38 (Hanakere Ex); Hassan Dairy: PB No 120, B M Rd, -573201; Ph: 8301; Gen Mgr: Sayanna, Ph off: 8221, 8170; Tumkur Dairy: PB No 4, Mallasandra, -572101;

Ph: 2264; Gen Mgr: K L Gajendran. Products: Butter, casein, ghee, peda, standardised milk (Miltone). Brand Name: Nandini. (See also Milk Plants).

KERALA COOPERATIVE MILK MARKETING FEDERATION LTD, 'Arkanilayam', Vazhuthacaud, Trivandrum 695014; Ph: 66645, 63113, Gram: Keramilk, Tlx: 357; Mg Dir: K J Alphons, IAS. Products: Butter, flavoured milk, ghee, ice-cream. Brand Name: Milma. (See also Milk Plants).

KEVENTER (S) (PRIV) LTD, EDWARD, Keventer Lane, Sardar Patel Marg, New Delhi 110021; Ph: 3012218, 3010857; Sr Exec Dir: G N Dalmia; Jt Mg Dir: Veru Dhasmana, Ph (resi): 6836846. Brand Name: Keventers.

KIRTIKUMAR MULJI PABARI & CO, 261 Narsi Natha St, Bombay 400009; Ph: 343494, 326510, Gram: Kirtiflag; Partner: Kirtikumar Mulji. Product: Ghee. Brand Name: KMP, Flag, Kirti.

KISHAN COOPERATIVE MILK PRODUCERS' UNION LTD, PO Ranaghat 741201, Dist Nadia, West Bengal; Ph: 116, Gram: Kishanmilk; Gen Mgr: S K Das. Product: Ghee. Brand Name: Kishan. (See also Dairy Cooperatives).

KOLHAPUR ZILLA SAHAKARI DUDH UTPADAK SANGH LTD, Plot No B-1, MIDC, Gokulshirgaon 416234, Maharashtra; Ph: 24308, 27478, Gram: Dudhsangh, Tlx: 0195-253 MILK IN; Mg Dir: S R Khadye. Brand Name: Gokul. (See also Dairy Cooperatives).

KRISHNA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Milk Products Factory, Vijayawada 520009; Ph: 75241, Gram: Milkhouse, Tlx: 232; Gen Mgr: Dr K V Pitchaiah; Plant Mgr: K Durga Prasada Rao. Products: Ghee, IMF, milk powder, dry ice cream mix. Brand Name: Vijaya. (See also Dairy Cooperatives).



LIPTON INDIA LIMITED, Marketing Foods Dept, Maker Tower 'F', 19th Floor, Cuffe Parade, Bombay 400005; Ph: 215100, 215451, 214915, Tlx: 011-2187; Chmn: B R Shah; Vice Pres: A N Bhatia; Mktg Mgr: V Kaushik; Gen Sales Mgr: T Sen; Sr Product Mgr: P Gupta. Branches -- Bombay: Ilaco House, Sir P M Rd, -400001; Calcutta: 35 Chittaranjan Avenue, PB No 7893, -700012; Madras: 150 Luz Church Rd, Mylapore, -600004; New Delhi: Dayanand Bhavan, 5/3 Asaf Ali Rd, PB No 3, -110002. Factory: Etah Dairy,

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Kasganj Rd, Etah, UP; Factory Mgr: B K Chaudhry. Products/Brand Names: Anik (Ghee), Anikspray (SMP), Leverspray (IMF).

MADHYA PRADESH DUGDH MAHASANGH (SAHAKARI)
MARYADIT, Guru Teg Bahadur Complex, Roshanpura, Bhopal 462003; Ph: 66058, 61365-6, Gram: Dugdhanigam, Tlx: 0705-237; Mg Dir: Jaimini K Sharma, IAS. Milk Product Factory: Indore Dugdh Sangh (Sahakari) Maryadit, Chanda Talawali Mangliya, Indore 453771; Ph: 38781, Gram: Dudhsangh, Tlx: 0735-233 MILK IN. Products: Casein, curd, flavoured milk, ghee, SMP. Brand Name: Sanchi, Shakti, Sneha.

MADURAI DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Santhamangalam, PB No 11, Madurai 625020; Ph: 24964, Gram: Aavin, Tlx: 0445-210; Mg Dir: S Ramasubbaiah; Mgr (Plant): V Rathinam; Mgr (Prod): S Dharmaraj. Products: Butter, flavoured, milk, ghee, ice cream mix powder, SMP, WMP. Brand Name: Aavin.



MAFCO LIMITED (A Govt of Maharashtra Enterprise), Mistry Bhavan, 6th Floor, Dinshaw Vachha Rd, Bombay 400020; Ph: 222244, Gram: Corpoagrid, Tlx: 011-5149; Mg Dir: Smt R A Jadhav; Dep Gen Mgr (Dairy Mktg): Mohan Advani; Dep Gen Mgr (Production): R R Mallya; Dep Gen Mgr (Mktg): G V Ghule. Branch Offices: Borivli, Koregaon, Nagpur, Nanded, New Bombay, New Delhi and Pune. Distributors: Sole selling agents for Aarey and Warana brand dairy products. Products: Butter, bland butter, cheese, flavoured milk (Energee), ghee, ice cream, paneer, shrikhand, SMP. Brand Names: Aarey, Warana.

MAHARASHTRA DAIRY DEVELOPMENT COMMISSIONER'S OFFICE, New Administrative Bldg, Abdul Gafarkhan Rd, Worli Seaface, Bombay 400018; Ph: 4937064, 4935928, Gram: Dairy-devcom; Dairy Dev Commisr: Navin Kumar, IAS, Ph: 4931571. Greater Bombay Milk Scheme: c/o Worli Dairy, Bombay 400018; Ph: 4937179, Gram: Milk; Gen Mgr: N D

Kotnis. Plants: Worli Dairy; Central Dairy, Aarey; Mother Dairy, Kurla. Product Factories -- Miraj: Govt Milk Scheme, Dist Sangli; Ph: 2693; Gen Mgr: D A Kohak, Ph (resi): 2694, Gram: Milk; Nagpur: Govt Milk Scheme, Seminary Hills, Nagpur; Ph: 32146, 24609; Gen Mgr: N J Pise, Ph (resi): 23259; Udgir: Govt Milk Scheme, Near S T Stand, Udgir, Dist Osmanabad; Ph: 92, 72, Gram: Milk; Gen Mgr: R B Ahire, Ph (resi): 191. Sole Distributors: Mafco Ltd, Bombay. Products: Butter, cheese, flavoured milk (Energee), ghee, ice cream, paneer, peda, shrikhand, SMP. Brand Name: Aarey.

MAHARASHTRA RAJYA SAHAKARI DUDH MAHASANGH
MARYADIT, NKM International House, 3rd Floor, West Wing, 178 Backbay Reclamation, Babubhai M Chinai Marg, Bombay 400020; Ph: 2024529, Gram: Cofedmilk; Mg Dir: R G Bansod, IAS; Dir (T&MD): V G Tulpule; Mgr (FO&AH): Dr M L Naware; Mgr (Mktg): S B Talekar. Product Factory: Mahanand Dairy, Unit No 12, Aarey Milk Colony, Goregaon (East), Bombay 400065; Ph: 687577/81/83/85/91; Gen Mgr: S A Sawant, Ph (resi): 687589. Products: Butter, ghee, shrikhand, SMP, WMP. Brand Name: Mahanand.

MEESANA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Dudhsagar Dairy, PB No 1, Mehsana 384002; Ph: 22201, Gram: Dudhsagar, Tlx: 0122-204; Mg Dir: Babubhai C Bhatt; Gen Mgr (PP&E): Vinodchandra M Patel; Gen Mgr (Comm): Kantilal M Shah; Asst Gen Mgr (PP&E): Madhubhai V Chaudhari. Products: Butter, casein, ghee, IMF, SMP, WMP. Brand Names: Amul, Sagar.

MEWAR ENTERPRISES, E/6D, DDA Flats, MIG, Mayapuri, New Delhi 110064; Ph: 533808, Gram: Fastfood; Mg Partner: Miss Uma Laxmi Ranawat. Product: Mozzarella cheese.

MIDNAPUR COOPERATIVE MILK PRODUCERS' UNION LTD, Biranbhawan, Rangamati, Midnapur 721101, West Bengal; Ph: 388 (Midnapur), Gram: Midmilk; Mg Dir: D K Das. Product: Ghee. Brand Name: Midmilk.

MILKFOOD LIMITED, Bhandari House, 91 Nehru Place, PB No 3522, New Delhi 110019; Ph: 6416505, 6410389, Gram: Milschen, Tlx: 031-61529 MILK IN; Mg Dir: K S Jaiswal; Exec Vice Pres: S P Khurana; Gen Mgr (Works): Jagtaran Singh; Gen Mgr (Comml): Umesh Saxena; Mktg Mgr (Dried Products): Rajesh Varma; Mktg Mgr (Frozen Products): Deepankar Barat; Production Mgr: R C Mahajan. Factory & Regd Off: PO Bahadurgarh 147021, Dist Patiala, Punjab;

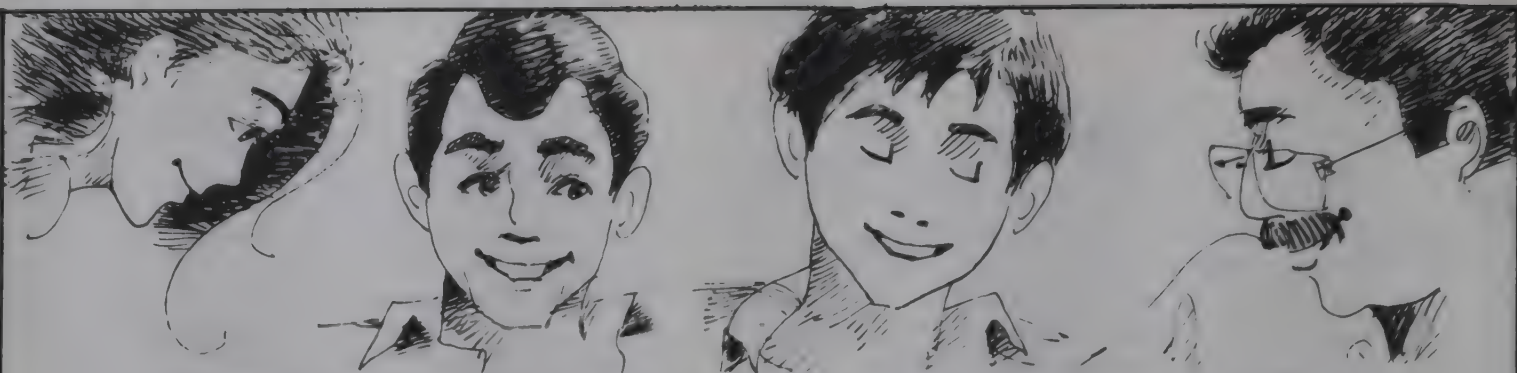
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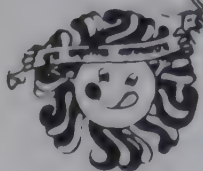
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- MILK PACK ENTERPRISES, G-44 Industrial Area, Lawrence Rd, Delhi 110035; Ph: 7128048; Mg Partners: Dr R P Singh, Tilak Raj. Products: Distributors of Nanak Milk and Products..
- MOTHER DAIRY CALCUTTA, PO Chakundi 712702, Dist Hooghly, West Bengal; Ph: 643578/9, 643182/3, Gram: Motherdairy, Chanditala; Gen Mgr: N A Shaikh, Ph off: 643575. Product: Mishtidoi (sweet curd).
- NAGAR MILK PRODUCTS, 8/99 Double Storey, Tilak Nagar, New Delhi 110018; Ph: 503660. Products: Cream, khoya, paneer.
- NAMBISAN'S DAIRY (P) LIMITED, No 34, Fourth Cross St, Mandavellipakkam, Madras 600028; Ph: 73187, 76221, Gram: Nambisons; Mg Dir: K K Mohan; Tech Dir: K K Viswanathan. Plant: Kangayam Rd, Uttukuli RS 638752, Dist Periyar; Ph: 52. Products: Butter, ghee, fermented milk products, pasteurized milk, flavoured & sterilised milk. Brand Name: Nambisan's.
- NANAK DAIRY PLANT, A-10/6 Vasant Vihar, New Delhi 110057; Ph: 672898; Founder: Nanak Singh, Ph (resi): 673530; Mg Partners: Shivraj Singh, Onkar Singh, Bhupinder Singh. Plant: Hodal (Haryana). Products: Flavoured milk, paneer. Brand Name: Nanak.
- NATIONAL DAIRY RESEARCH INSTITUTE, Karnal 132001; Ph: 4293, Gram: Dairysearch; Dir: Dr R Nagarcenkar; Head, Dairy Tech Div: Dr S K Gupta, Ph: 2843; Scientists: Dr B N Mathur, Dr S A Singh, Dr G S Rajorhia, Dr R Balachandran. Products: Butter, casein, cheese, cream, flavoured drink, ghee, ice cream powder, lassi, paneer, SMP, sweets, yoghurt.
- NEMICHAND MADANLAL, PB No 198, Raibahadur Bldg (RW), R Agraharam, Guntur 522003; Ph: 24311; Prop: Multanmal, Ph (resi): 20252. Branch: Indore. Product: Ghee.
- NILGIRI DAIRY FARM PRIVATE LTD, 171 Brigade Rd, Bangalore 560001; Ph: 572641, 577501, Gram: Butter; Estd: 1905; Mg Dir: M Chenniappan; Dir: M Chellayan. Products: Butter, cheese, cream, curds, ghee, etc.
- NOBLE SOYA HOUSE LTD, Noble House, Administrative Bldg, c/o Godrej Soaps Pvt Ltd, Eastern Express Highway, Vikhroli (E), Bombay 400079; Ph: 589519, 589520, 589523, Tlx: 71480 AVIX IN; Pres & Chief Exec: S H Perwani, Ph off: 589520, resi: 362412; Vice-Pres (Mktg): S S Sami; Vice Pres (Tech): Dr A S Aiyar; Vice Pres (Finance): Ravi K Sheth. Factory: E-7/ 638 Shahpura, Arera Colony, Bhopal;
- Ph: 66231, Gram: Soyahouse, Tlx: 0705-328; Gen Mgr (Works): Gopal Sharma. Products: Soya Milk and Beverages.
- OOTY DAIRY, Market, Udhagamandalam, Tamil Nadu; Ph: 2774, 3033; Prop: V A Mohamed Jaffer. Products: Butter, ghee.
- PAL MILK PRODUCTS (P) LTD, 8 Mohanlal Mansion, King's Circle, Bombay 400019; Ph: 474411, 475808, Gram: Palfamily; Mg Dir: Subhash N Pal, Ph (resi): 6129923. Branch: 6 Trimurti, 122 S V Rd, Santacruz (W), Bombay 400054; Ph: 6127319.
- PANCHMAHAL DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Near SRP Camp, Lunawada Rd, PB No 37, Godhra 389001, Gujarat; Ph: 2660, 2671, Gram: Panchamrut; Gen Mgr: R K Mathur. Products: Ghee, milk. (See also Dairy Cooperatives).
- PANKAJ DAIRY FARM, 14/1 Ramakrishnappa Rd, Cox Town, Bangalore 560005; Ph: 574806; Prop: N Rajanna. Products: Curd, flavoured milk.
- PANTNAGAR SOYMILK PRODUCTS P LTD, B-68 Mayapuri, Phase I, New Delhi 110064; Ph: 592782, 590908, Gram: Tin Print, Tlx: 31-5403 AMAR IN; Mg Dir: Amrish Mehra, Ph (resi): 674270. Factory: Noida; Ph: 8053041. Products: Soymilk and Soyfoods. Brand Name: Sipso.
- PARSI DAIRY FARM, 261-63 Shamaldas Gandhi Marg, Bombay 400002; Ph: 313633, 313634; Estd: 1916; Mg Partners: Dinshaw Nariman, Merwan Nariman, Naval Nariman, Rustom Nariman, Jeroo Nariman; Tech Consultant: R D Patel. Branches: (i) Hari Niwas, Lalbaug, Bombay 400012; Ph: 4132584; (ii) Soona Lodge, Tilak Bridge, Dadar, Bombay 400014; Ph: 4303031; (iii) Kavarna Bldg, Poibavadi, Bombay 400012; Ph: 4131526. Products: Butter, cottage cheese, cream, ghee, kulfi, shrikhand, sweets, yoghurt (12 varieties).
- PRADESHIK COOPERATIVE DAIRY FEDERATION LTD, 29 Park Rd, Lucknow 226001; Ph: 44401, 32448, 48214, Gram: Dairyfed, Tlx: 0535-285; Mg Dir: V K Sharma, IAS. Product Factories -- Faizabad: Saket Dairy, Ayodhya Rd; Ph: 2765, Gram: Dairyfed; Gen Manager: S N Susari; Meerut: Feeder Balancing Dairy, Gangol Rd, Partapur, Meerut; Ph: 8568, Gram: Dairyfed, Tlx: 594-237 MILK IN; Gen Mgr: O P Yadav; Moradabad: Infant Milk Food Factory, PB No 17, Dalpatpur; Ph: 4006, Gram: Dairyfed; Gen Mgr: P K Gupta; Varanasi: Feeder Balancing Dairy, Industrial Area, Ramnagar, Varanasi; Ph: 63472, Gram: Dairyfed, Tlx: 0545-287 PCDF IN; Gen Mgr: V K Tiwari.

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PREMILA'S NORTH STAR FOOD PRODUCTS, X-13
Hauz Khas, New Delhi 110016; Ph: 667841; Prop: J S Malik.

Head Off: 38 Alkapuri, Alwar 301001, Rajasthan; Plant Mgr: P V N S Rao; Collection Centre Scheethal: Mukesh Aggarwal. Products: Cheese (Californian, Cheddar, Cottage, Cream, Feta, Mozzarella, Processed); flavoured milk and milk/coffee, khoya, pasteurised cream and paneer. Brand Name: Premila's.

PUNE ZILHA SAHAKARI DUDH UTPADAK SANGH
MARYADIT, Katraj, Pune-Satara Rd, Pune 411046; Ph: 440697, 442042; Mg Dir: R L Meher; Dairy Mgr: M N Patel. Products: Butter, cream, shrikhand. Brand Name: Njoy. (See also Dairy Cooperatives).

PUNJAB STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, SCO No 3015-18, Sector 22-D, Chandigarh; Ph: 20715, 29667, 27224, 31995/6, Gram: Milkfed, Tlx: 0295-341; Mg Dir: A S Sodhi, IAS. Product Factories: Amritsar, Bhatinda, Chandigarh, Hoshiarpur, Jalandhar, Ludhiana, Mohali, Sangrur. Sales Offices — Assam: K R Choudhry Rd, Kamarpura, PO Bharalumukh, Guwahati 781009; Ph: 27675, Gram: Verka; Area Sales Mgr: S K Dudeja, Ph (resi): 27675; Bihar: C-17 Srikrishnapuri, Patna 800001; Ph: 63427 PP, Gram: Verka; Area Sales Mgr: E S Sundaram; Delhi: 9-10 Main Gurdwara Rd, Karol Bagh, New Delhi 110005; Ph: 5717390, Gram: Verkahouse; Regl Sales Mgr: Gagan Bayond, Ph (resi): 2522619; Haryana: 834 Urban Estate, Ambala City; Ph: 58549 PP; Dep Mgr-Mktg: K K Goel; Himachal Pradesh: Dharamshala Rd, Birta, Kangra Dist; Area Sales Mgr: S S Wadhavan; Sub-Depot: Parwanoo; Jammu & Kashmir: 19 Glass Bagh, Gogji Bagh, Srinagar; Ph: 78334 PP, Gram: Milkfed; Area Sales Mgr: S K Thakur; Sub-Depot: Jammu; Madhya Pradesh: c/o Ajanta Lodge, 8 Film Colony, Indore; Field Sales Rep: Gopal Dutt, Ph: 38066 PP; Maharashtra: Laxmi Silk Mills Compound, Kasurchand Mills Estate, Near Kabutarkhana, M C Jawle Rd, Dadar, Bombay 400028; Ph: 4223831, Godown: 8724609, Gram: Gheedudh; Regl Sales Mgr: R L Vohra; Rajasthan: Show Room No 67, Tpt Nagar, Agra Rd, Jaipur 302003; Ph: 45714 PP, Gram: Verkahouse; Sub-Depot: Jodhpur; Uttar Pradesh: 7-E Clive Rd, Allahabad 211001; Ph: 3536,

Gram: Verka; Area Sales Mgr: E S Sundaram, Ph (resi): 3536; Sub-Depot: Ghaziaabad; West Bengal: 64 Ballygunge Gardens, Calcutta 700019; Ph: 461272, Gram: Pabcomilk; Regl Sales Mgr: Y P Garg, Ph (resi): 462625. Products: Butter, cheese, flavoured milk, ghee, IMF, SMP, WMP. Brand Names: Amber, Verka. (See also Milk Plants).

PUNJABI GHASTIARAM HALWAI (PG), 58-D Mohamedali Rd, Bombay 400003; Ph: 322463, 349420, 343170; Partners: P D Bajaj, Vinod Bajaj, Vijay Bajaj, Sudhir Bajaj. Factory & Head Office: A to Z Industrial Estate, Ganpatrao Kadam Marg, Bombay 400013; Ph: 4929396, 4925591, 4942448. Products: Khoa, malai cream, paneer, Indian sweets.

RAJ DAIRY (REGD), 129/20 Rajgarh Colony, Gandhinagar, Delhi 110031; Ph: 212799; Partners: Kedar Nath Kandhari, Pradeep Kumar Kandhari. Products: Butter, cream, ghee. Brand Name: Raj.

RAJASTHAN COOPERATIVE DAIRY FEDERATION LTD, Saras Sankul, Jawahar Lal Nehru Marg, Jaipur 302017; Ph: 78791-4, Gram: Dairyfed; Mg Dir: N K Varma, IAS, Ph: 62535. Product Factories — Ajmer: Beawar Rd; Ph: 20152; Gen Mgr: S K Miglani; Quality Control Offr: S B Mittal; Alwar: Jaipur Rd; Ph: 3626, 3374; Mgr: C K Rai; Dairy Engr: D N Mathur; Quality Control Offr: A K Sharma; Bhilwara: 5 Km, Ajmer Rd; Ph: 6686; Mgr: R Bhatia; Quality Control Offr: A K Sharma; Bikaner: Sri Ganganagar Rd; Ph: 4930, 4332; Gen Mgr: D M Behl; Dairy Engr: R G Khandelwal; Quality Control Offr: V K Punj; Jaipur: Near Gandhi Nagar Rly Stn, -302017; Ph: 68781; Gen Mgr: P K Garg; Mgr (Plant): V K Deora; Dairy Engr: R K Taksali; Quality Control Offr: Ajab Singh; Jodhpur: 35 Heavy Indl Area; Ph: 22913; Mgr: R K Singh; Quality Control Offr: B B Garg; Kota: Near Akalgarh; Ph: 26659; Mgr: P N Wali; Raniwara: Industrial Area, -343040; Ph: 58; Mgr: S K Chopra. Products: Butter, casein, ghee, IMF, SMP. Brand Names: Saras. (See also Milk Plants).

RAJKOT DAIRY (Managed by Gujarat Dairy Dev Corp'n Ltd), Dudh Sagar Marg, Rajkot 360003; Ph: 87353/4, 87141, Gram: Puremilk; Gen Mgr: G R Ralhan, Ph (resi): 87164. Products: Butter, ghee, peda, flavoured milk, SMP. Brand Name: Gopal.

RATTAN MILK PRODUCTS, F-33 Kirti Nagar, Main Market, New Delhi 110015; Ph: 534951. Products: Cream, dhab, khoya, paneer.



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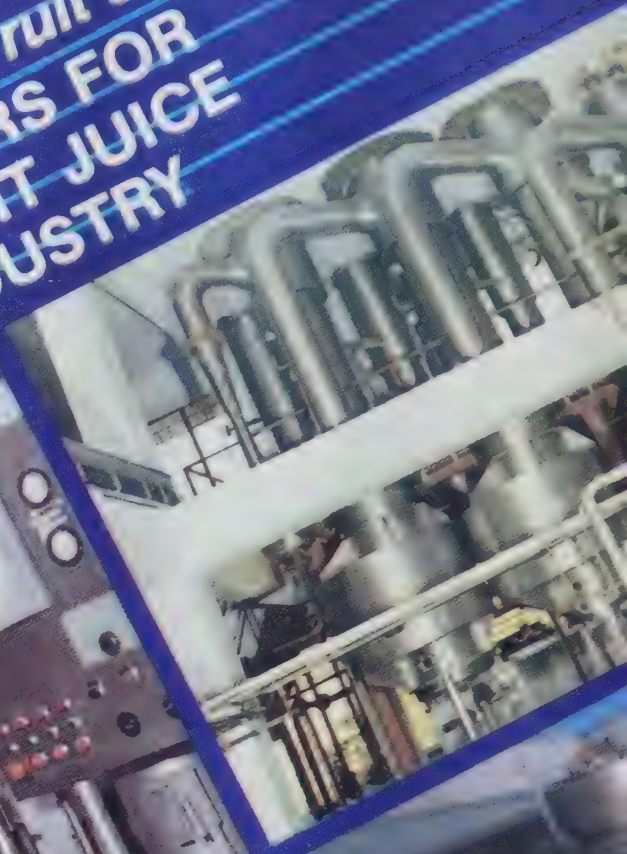
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RUPA DAIRY (REGD), Arya Samaj Mandir, Krishna Nagar, Delhi 110051; Ph: 212902; Prop: Suresh Kumar Kandhari. Products: Butter, cream, ghee. Brand Name: Rupa.

S P JAGDISH & CO, 1222 Stock Exchange Towers, 12th Floor, Dalal St, Fort, Bombay 400023; Ph: 271212, 271717, Gram: Casinmaker; Mg Partner: Jagdish C Shah, Ph (resi): 4129418. Branch: S B Compound, near Samarkha Railway Crossing, Anand 388001; Ph: 3744, Gram: Shahbros; Mgr: Chandrakant K Shah. Product: Casein. Brand Name: SPJ.

SABARKANTHA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, PB No 21, Himatnagar 383001, Gujarat; Ph: 801-4, Gram: Sabardairy, Tlx: 012-291; Mg Dir: Babubhai K Rabari, Ph (resi): 409; Asst Gen Mgr (P&E): R S Sheth. Products: Butter, ghee, IMF, shrikhand, SMP, WMP. (See also Dairy Cooperatives).

SAMANT BROS, Vasant Nivas, Senapati Bapat Marg, Dadar, Bombay 400028; Ph: 4302543, 4308487, 4226622, Gram: Purebutter; Partner: N S Samant. Products: Butter, cream, chakka, ghee, shrikhand and sweets.

SAMANT DAIRY PRODUCTS PVT LTD, Senapati Bapat Marg, Dadar, Bombay 400028; Ph: 4302543, 4308487, Gram: Purebutter; Mg Dir: N S Samant. Products: Shrikhand, table butter, white butter. Brand Name: Samant.

SAMTA MILK FOODS PRIVATE LIMITED, 5 Mehta House, 2nd Floor, 36 Pandita Ramabai Rd, Bombay 400007; Ph: 8281435; Dirs: Dr J V Parekh, Ph (resi): 6405358, R V Shah, Dinesh C Kaji.

SHREE MILK SUPPLY, 23 Sirur Park Rd, Seshadripuram, Bangalore 560020; Ph: 364278, Gram: Shreemilk; Mg Partner: R C Patel. Products: Butter, cream, ghee, khoa and paneer.

SHIVAMRUT DOODH UTPADAK SAHAKARI SANGH LTD Akulj, At Shankarnagar, PO Yeshwantnaga 413118, Tal Malshiras, Dist Sholapur, Maharashtra; Ph: Akulj 126, 426, Gram: Shivamrut; Mgr: B M Ranaware. Products: Barfi, ghee, pedha, shrikhand. Brand Name: Shivamrut.

SHREE WARANA SAHAKARI DUDH UTPADAK PHAKRIYA SANGH LTD, At Amrutnagar, PO Waranagar 416113, Dist Kolhapur, Maharashtra; Ph: 27, 28, 68, 69, Gram: Waranadudh; Chmn: D A Kore; Mg Dir: C N Gulave. Sole Distributors: Mafco Limited, Bombay. Products: Flavoured milk, ghee, shrikhand, SMP, WMP. Brand Name: Warana.

SIMCO FOOD PRODUCTS, C-1.B 137/138, GIDC Estate, Vatva 382445, Gujarat; Ph: 876420, 876446, 877535, Gram: Simcofood; Mg Partner: M K Kinger, Ph (resi): 877534. Products: Candies and toffees. Brand Name: Simco.

SRI RAMAKRISHNA DAIRY, 176 S B Rd, Visveswarapuram, Bangalore 560004; Ph: 603482, Gram: Orkayfood. Products: Instant mixes. Brand Name: Orkay.

SUBODH BIPINCHANDRA & CO, Old Madhupura, Ahmedabad 380004; Ph: 336878, 339922, Gram: Subico; Partners: Prafullbhai, Ph (resi): 348020, Bipinbhai, Ph (resi): 411880. Products: Ghee, SMP.

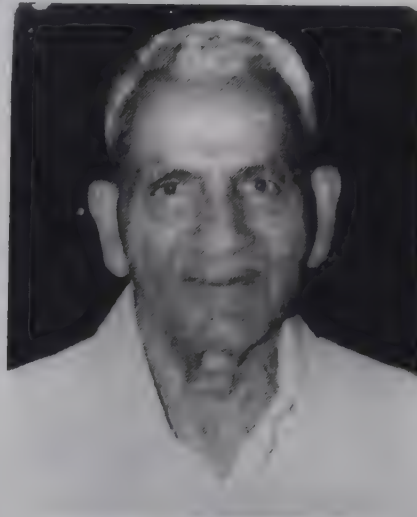
SUGAM DAIRY (A unit of the Baroda District Cooperative Milk Producers' Union Ltd, managed by the National Dairy Development Board), Makarpura Rd, Baroda 390009; Ph: 555066, 555220, 541206, Gram: Sugamdairy, Tlx: 0175-294; Chmn, Management Committee: Dr R P Aneja; Gen Mgr: V C Sood. Products: Chaisathi, gulabjamun, peda, rasgolla, shrikhand. Brand Name: Sugam.

SUPAT DISTRICT COOPERATIVE MILK PRODUCERS' UNION LIMITED, Sumul Dairy, PB No 501, Surat 395008; Ph: 27691-5, Gram: Sumul, Tlx: 0178-208; Mg Dir: Dr Thakorabhai D Patel, Ph: 31172; Asst Gen Mgr: Ramanbhai B Patel; Mgr (Prod): M O Shah; Mgr (Sales): Jimmy Engineer; Mgr (QC): S M Naik; Mgr (APS): D M Eulyalkar. Products: Casein, ghee, SMP, WMP. Brand Name: Sumul. (See also Dairy Cooperatives).

TAMILNADU COOPERATIVE MILK PRODUCERS' FEDERATION LTD, Aavin Illam, Madhavaram Milk Colony, Madras 600051; Ph: 575531-35, Gram: Aavin, Tlx: 041-217; Mg Dir: V Karuppan, IAS; Gen Mgr: M H Jalal, IAS. Feeder Balancing Dairies: Erode, Krishnagiri, Madurai, Salem. Products: Butter, ghee, milk powder. Product Factories: Ayyanavaram (Products: Ice cream, khoa, lassi, yoghurt), Kodaikkanal (Product: Cheese), Madhavaram (Product: Flavoured milk). Brand Name: Aavin. (See also Milk Plants).

TANNY DAIRY FOODS PVT LTD, 4 Neha Apartment, 5 J P Rd, 7 Bunglow, Andheri (West), Bombay 400058; Ph off: 358708, factory: 366005, Gram: Loversgift; Mg Dir: Najmudin Bookwala, Ph (resi): 575507; Sr Exec: Jalal Lokhandwala. Branch: 59 Behramji Jijibhoy Rd, Band Stand, Bandra, Bombay 400050; Ph: 361356; Mgr: T A Murdhani. Product: Flavoured milk.

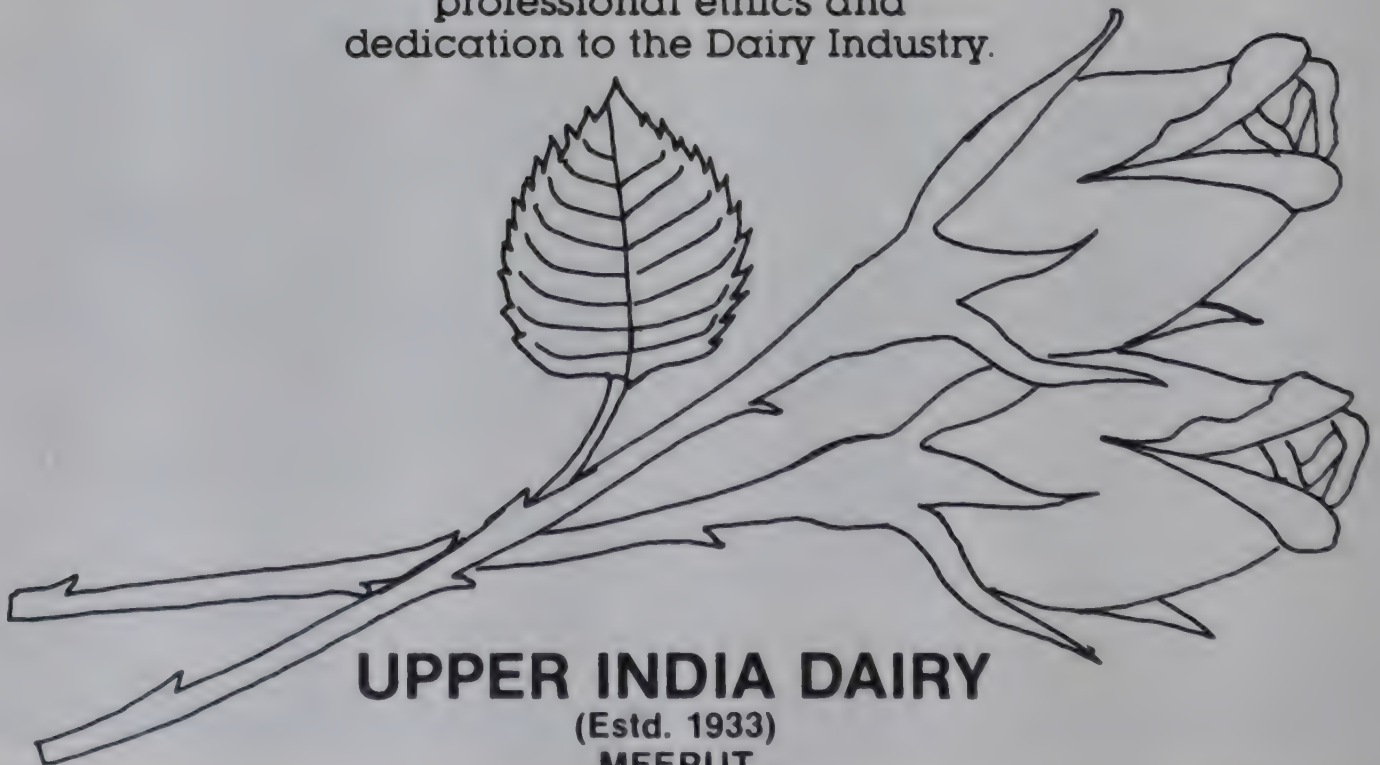
TRIPURA COOPERATIVE MILK PRODUCERS UNION LTD,



1907-1985

Homage to A Leader

On the Second Anniversary of
SHRI GOPAL
the management and the staff of
UPPER INDIA DAIRY, MEERUT
pay their respectful homage
to their beloved founder,
and pledge themselves to
pursue with greater zeal
and vigour the objectives of
professional ethics and
dedication to the Dairy Industry.



UPPER INDIA DAIRY

(Estd. 1933)

MEERUT

Agartala Dairy, Indranagar, Agartala
799006; Ph: 3524, 3801; Mg Dir: J L Kar;
Gen Mgr: M L Chakraborty. Product: Ghee.

UPPER INDIA DAIRY, P L Sharma Rd, Meerut
250006, UP; Ph: 72109; Mg Partner:
Rajendra K Goyal. Products: Butter,
ghee, paneer. Brand Name: Gopals.

VALSAD DISTRICT COOPERATIVE MILK PRODUCERS'
UNION LTD, Vasudhara Dairy, N H No 8, At
Alipur 396409, Tk Chikhli, Gujarat; Ph:
287, 423, 399 (Chikhli Ex), Gram: Vasu-
dhara; Gen Mgr: N B Vashi. Product: Ghee.

WEST BENGAL DAIRY & POULTRY DEVELOPMENT
CORPORATION LTD, 16 Netaji Subhash Rd,
3rd Floor, Calcutta 700001; Ph: 229432,
Gram: Dairpoul; Mg Dir: K P Banerjee,
Ph: 224579. Factory: 62 Rose Marg Lane,
Howrah. Product: Miltone (Milk like
beverage).

WEST BENGAL DIRECTORATE OF DAIRY DEVELOP-
MENT, Haringhata Dairy Factory, Harin-
ghata Farm, PO Mohanpur, Dist Nadia; Ph:
Kalyani 430, 432, 623, Gram: Haresmical;
Incharge, Dep Milk Commissr: Vacant.
Head Off: 23-A Netaji Subhash Rd, 9th
Floor, Calcutta 700001; Ph: 204535/6;
Milk Commissr: J P Pal, Ph: 257494. Pro-
ducts: Casein, chocolate, flavoured milk,
ghee, milk biscuits. Brand Name: Camiss.

Sun-Sip®

WIMCO LIMITED, Indian Mercantile Chambers,
Ramjibhai Kamani Marg, Ballard Estate,
Bombay 400038; Ph: 262583, 269483, Gram:
Westmatch, Tlx: 011-73506 WIBO IN; Mg
Dir: Kamaljit Singh; Exec Vice Presi-
dents: S K Jain, V K Bhalla; Vice Pres
(Foods & Trading); Dr S D Varde; Gen Mgr
(Technical): S N Prahlad. Branches —
Calcutta: Alambazar, -700035; Ph: 582063/
65, Gen Mgr: S Grover; Mktg Off: Welles-
ley House, 7 Red Cross Place, -700001;
Ph: 282243/44; Regl Mktg Mgr: G S Mamik;
Delhi: Allahabad Bank Bldg, 17 Parliament
St, -110001; Ph: 345608, 323195; Liaison
Mgr: S Subramaniam; Madras: PB No 2273,
Tiruvottiyur, -600019; Ph: 553211/15;
Regl Mgr: B V Venkatadri; Mktg Off: PB No
732, 3 Tiru Vi Ka Rd, Madras 600006; Ph:
89123/24; Regl Mktg Mgr: Rajan Iyer.

Advertisements in this YEARBOOK themselves serve
as a Who's Who of the industry. They serve as the
manufacturer's catalogue and supplement the basic
data give in the various listings.

Late Additions

AGARWAL & COMPANY, 202/C Dr Ambedkar Rd,
Palace Talakies, Byculla, Bombay 400027;
Ph: 8729228, 8728707, 8515314, 867401,
Gram: Powder Milk; Prop: Radheshyam N
Agarwal, Ph (resi): 4926050, 4029326,
4922547; Gen Mgr: Sudesh Dixit; Mgr Mktg:
H Khan. Branch: 64 Masjid Bunder Rd, Bom-
bay 400003; Ph: 8555309, 8559154, 8559785,
8557185; Mgr: Anil Vasani. Products: Skim-
med milk powder & whole milk powder. Brand
Names: Shri Ambika, Amrut.

ASHISH CHEESE PRODUCTS, Khasra No 363/2,
Vill Sultanpur, Teh Mehrauli, New Delhi
110030; Ph: 657713; Partners: Mrs Swarn
Lata, K S Mehta; Mgr: Rakesh Gureja, Ph:
6437357. Product: Cheese. Brand Name:
Asli Cheese.

ASHISH ENTERPRISES, Cheese House, B-1 Zam-
roodpur (Nehru Market), Opp LSR College,
New Delhi 110048; Ph: 6432632, Tlx: 3998
ND IN; Partner: Dr A K Choudhery, Ph
(resi): 6417802, 6416768. Product: Cheese.

CENTRAL ARECANUT AND COCOA MARKETING AND
PROCESSING COOPERATIVE LIMITED (CAMPCO),
Sahakari Mahal, PB No 223, Mangalore
575001, Karnataka; Ph: 22398, Gram:
Campco, Tlx: 842-272; Pres: Varanasi
Subraya Bhat; Mg Dir: A A Desai. Factory:
Campco Chocolate Factory, Kemminje, Put-
tur, Dakshina Kannada Dist, Karnataka;
Ph: 6207. Products: Cocoa based products
like Cocoa powder, cocoa butter, cocoa
mass, milk chocolates, creamy white choco-
lates, enrobed chocolates, cocoa bever-
ages, etc. Brand Name: Campco.

FUN FOODS PVT LTD, Shop No 17, B-2 Shopping
Centre, Safdarjung Enclave, New Delhi
110029; Ph: 606567; Partners: S P Arora,
Rajiv Behl. Product: Yoghurt. Brand Name:
Fun-food.

INDOVITA PROTEINS PVT LTD, S-1 Bulandshahr
Rd, Industrial Area, Ghaziabad; Ph:
654768 (New Delhi); Mg Dir: R Swarup;
Dir: Deepak Swarup. Products: Soyamilk
and soyafoods.

KODAI DAIRY PRODUCTS, Fern Hill Rd, Kodai-
kanal 624101, Tamil Nadu; Ph: 493; Mg
Partner: G K Sanker, Ph (resi): 494;
Partner: G S Mani. Branches: Bangalore,
Bombay, Madras (Ph: 74658), Pondicherry.
Products: Cheese (Cheddar, Herbal Cheddar,
Gruyere), Butter, Cream & Whey butter.
Brand Name: Kodai.



BAIF

VETERINARY PRODUCTS

CATTLE VACCINES

FMDV

Foot & Mouth Disease Vaccine
B. Vet. C. Concentrated, Quadrivalent
(O, A, C, Asia-1 Types)

Foot & Mouth Disease Vaccine
B. Vet. C. Concentrated, Monovalent
(O, A, C, Asia-1 Types &
A 22 Subtype respectively)

RP

Freeze Dried, Tissue Cultured
Rinderpest Vaccine (T.C.R.P.),
Live; B.P. Vet.)

HS

Haemorrhagic Septicaemia Vaccine
(BAIF - Aluminex • Adjuvanted)

BQ

Black-Quarter Vaccine
(BAIF - Aluminex • Adjuvanted)

HS-BQ

Haemorrhagic Septicaemia
& Black Quarter Combined Vaccine
BAIF Aluminex • Adjuvanted)

C19

Brucella Abortus C-19 Vaccine (Live)

PHARMACUTICALS

CBC

Calcium Borogluconate
Compound Injection - B. Vet. C.

CB

Calcium Borogluconate
Injection - B.P. (Vet.)

ST

Sulphadiazine and Trimethoprim
Injection - B,P, (Vet.)

SDM

Sulphadimidine Sodium Injection
33 1/3 % B.P. (Vet.)

AS

Atropine Sulphate
Injection - B.P. (Vet.)

SBD

Stilboestrol Injection B.P. (Vet.)

POULTRY VACCINES

MDV

Marek's Disease Vaccine
B.P. Vet (Living) HVT-FC-126 Strain

NDV-MUKT

Newcastle Disease
(Ranikhet Disease) Vaccine
(Living) Mukteswar Strain

NDV-F Newcastle Disease
(Ranikhet Disease) Vaccine
(Living) F Strain

NDV-L Newcastle Disease
(Ranikhet Disease) Vaccine
(living) LaSota Strain

FPV

Fowl Pox Vaccine (Living)

SPA

Salmonella Pullorum Antigen

RANIPOX New Castle
Disease (Ranikhet Disease)
Mukteswar Strain and Fowl Pox
Combines Vaccine

IB

Avian Infectious Bronchitis
Vaccine

AT

Adrenalin Injection B.P.(Vet.)

DEX 20%

Dextrose Injection
20% B.P. (Vet.)

DEX 10%

Dextrose Injection
10% B.P. (Vet.)

DEX 5%

Dextrose Injection
5% I.P. (Vet.)

DS

Dextrose Saline Injection U.S.P.,
(5% Dextrose &
0.9% Sodium Chloride)

NS

Normal Saline Injection
(0.9% Sodium Chloride)

WI

Water for Injection I.P.

SHEEP VACCINES

MCV

Multi Component Vaccine pentavalent
concentrated
(Contains Clostridium Welchii type B, C and D
Clostridium Septicum, Clostridium Oedematis
Toxoids.) Adjuvanted with BAIF Gel-Aluminex •

ETV-D

Enterotoxaemia Vaccine
Clostridium Welchii Type D Toxoid Adjuvanted
with BAIF Gel-Aluminex •

ETV-CD

Enterotoxaemia Vaccine
Clostridium Welchii Type C and D Toxoid Adjuvanted
with BAIF Gel-Aluminex •

DIAGNOSTICS

BPA

Brucella Plain Antigen.

ABR

Abortus Bang Ring Antigen.

BCA

Brucella Coloured Antigen.

RBA

Brucella Rose Bengal Antigen.

TBN

Tuberculin (Mammalian)
Concentrated.

SPA

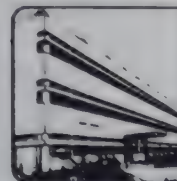
Salmonella Pullorum Coloured Antigen.

MDR

Mastitis Diagnostic Reagent.

Insist on
BAIF veterinary products
for
assured health cover

PRODUCED & MARKETING BY:



BAIF
LABORATORIES

BIRANAGAR
OFF. WAGHOLI-412207
DIST. PUNE (INDIA)

Disease Diagnostic Centres

Listed regionwise below are specialized disease diagnostic centres/laboratories. Also, a network of some 16,000 veterinary hospitals and dispensaries and another 20,000 veterinary first aid centres under the State Departments of Animal Husbandry assist in disease control.

Northern Region

DELHI

CHAWLA VETERINARY HOSPITAL, H-9 Vijay Chowk, Krishna Nagar, Delhi 110051; Ph: 212463; Vet Surgeon: Dr P C Chawla.

DELHI ADMINISTRATION, AH Dept, Room No 98-101, Old Secretariat, Delhi 110054. VET HOSPITALS: Arjun Nagar, Bhatti Mines, Bhalswa, Bhogal, Burari, Chirag Delhi, Fatehpur Bori, Gazipur, Gharoli, Goela, Hastals, Jharoda, Jheel, Kakrola, Karol Bagh, Kanjhawala, Kapashera, Madanpur Khadar, Mahipal Pur, Masoodpur, Nangli Sakrawati, Nangloi (Touring Dispensary), Shahdara (Touring Dispensary), Shakarpur, Singhu Border, Tikri Kalan. MUNICIPAL CORPORATION OF DELHI -- Hospitals & Dispensaries -- Alipur, Badarpur, Badli, Bawana, Bijwasan, Daulatpur, Dhansa, Jharoda, Karawal Nagar, Mehrauli, Najafgarh, Nangloi, Narela, Palam, Pehlad Pur, Qutab-Garh, Shahdara, Tihar, Tis Hazari, Zakhira.

NEW DELHI MUNICIPAL COMMITTEE -- Vet Hospital, Moti Bagh I, New Delhi 110021; Ph: 672161; Offr Incharge: Dr Shamsher Bahadur; Disease Control Offr: Dr Suraj Mal Dahiya.

HARYANA

COLLEGE OF VETERINARY SCIENCES, HAU, Hisar 125004; Ph: 4602, Gram: Vetcol; Dept of Vet Public Health & Epidemiology: Dr R C Kulshreshtha. VET POLYCLINIC: Dept of Gynaecology & Obsts: Dept of Vet Clinics; Ph: 4133; Dir of Clinics: Dr I S Chandna, Ph (resi): 3175; Dep Dir: Dr B M Khanna; Asst Hospital Surgeons: Dr D K Sharma,

Dr Prem Singh; Lecturer, Vet Surgery: Dr S M Bhel.

DISEASE INVESTIGATION LABORATORIES, HAU -- Central Laboratory: Hisar; Offr Incharge: Dr R C Kulshreshtha, Ph: 4602; Ambala City: Disease Investigation Offr: Dr Jagjit Singh, Ph: 56249; Gurgaon: Disease Investigation Offr: Dr D K Balani, Ph: 2609; Karnal: Asst Disease Investigation Offr: Dr J D Ghosh, Ph: 2650; Rohtak: Asst Disease Investigation Offr: Dr R K Kaushik, Ph: 4714.

NATIONAL DAIRY RESEARCH INSTITUTE (NDRI), Karnal 132001; Ph: 2096, Gram: Dairy-search; Div of Cattle Genetics & Breeding, Head: Dr M Gurnani; Incharge, Cattle Yard: Dr O S Tomer.

JAMMU & KASHMIR

GOVERNMENT OF JAMMU & KASHMIR, AH Dept -- JAMMU DIV: Dep Dir, Res & Production, R S Pura: Dr J L Raina. Disease Investigation Offrs -- Doda: Dr P L Tandon; Jammu: Dr O N Raina; Kathua: Dr K K Gupta; Poonch: Dr B D Sharma; Rajouri: Dr M L Trakru; Udhampur: Dr M M Gupta; KASHMIR DIV: Dist Clinical Laboratories: Anantnagh, Badgam, Baramulla, Kargil, Kupwara Leh, Pulwama. INDIAN VETERINARY RESEARCH INSTITUTE, Regl Res Station, Rawalpura, Srinagar 190005; Ph: 75527; Incharge: Dr D N Dhar. SHER-E-KASHMIR UNIVERSITY OF AGRICULTURAL SCIENCE & TECHNOLOGY, Faculty of Vet Sc & AH, Baghi Ali Mardan Khan, Nowshera, Srinagar 190011; Incharge, Head: Dr Abdul Rashid.

PUNJAB

GOVERNMENT OF PUNJAB, Disease Investigation Laboratory, c/o State Livestock Sanitary Laboratory, Jalandhar. VET POLYCLINICS: Faridkot, Gurdaspur, Hoshiarpur. PUNJAB AGRICULTURAL UNIVERSITY, Animal

**Ideal as a pessary in the treatment
of all infections of the uterus**

AUREOMYCIN^{*}

Chlortetracycline

SOLUBLE OBLETS[†]

Oblong Tablets 500 mg.

- **Rapid absorption**
- **Simple, convenient dosage**
- **Long-lasting therapeutic effectiveness**
- **Low treatment cost**

DOSAGE :

Prevention of Infections of Uterus: 1 OBLET inserted deep into uterus after calving. If afterbirth membranes are retained, use 2 OBLETS. If uterine infections are a herd problem, insert 1 OBLET when the afterbirth membranes are expelled.

PACKING: Bottle of 12.



• Registered Trademark of American Cyanamid Company.

† Trademark

Disease Research Centre, Coll of Vet Sc, Ludhiana 141004; Ph: 22960/385, Gram: Vetcol; Sr Scientist (VDI): Dr M S Kwatra; Virologist: Dr G K Singh; Pathologist: Dr Balwinder Singh Gill; Bacteriologist: Dr Dev Raj Sharma; Asst Scientist (Bovine Disease Investigation): Dr P C Mandal.

RAJASTHAN

COLLEGE OF VETERINARY & ANIMAL SCIENCES, Sukhadia Univ, Bikaner 334001; Ph: 3178, Gram: Rajvetcol. Dept of Vet Pathology, Prof & Head: Dr P L Arya.

GOVERNMENT OF RAJASTHAN, Dept of AH, Jaipur VET POLYCLINICS — Ajmer 305001: Naya Bazar; Asst Dir: Dr I D Mathur, Ph: 20447; Bikaner 334001: Asst Dir: Dr R S Sisodia, Ph: 23708; Jaipur 302001: New Colony; Asst Dir: Dr S P Banerjee, Ph: 73237; Jodhpur 342001: Asst Dir: Dr S R Kachhwa, Ph: 20248; Kota 324001: Asst Dir: Dr P S Lohmi, Ph: 24965; Udaipur 313001: Asst Dir: Dr B B Prasad, Ph: 23408.

LIVESTOCK FIELD INVESTIGATION STATION, Bassi 303301, Jaipur Dist; Offr Incharge: Dr A K Purohit, Anim Pathologist.

S K N COLLEGE OF AGRICULTURE, Jobner 303329; Ph: 22; Dean: Dr R C Mehta.

UTTAR PRADESH

ALLAHABAD AGRICULTURAL INSTITUTE, PO Agricultural Inst, Allahabad 211007; Ph: 7441, Gram: Agrinst. Dept of AH, Prof, Anim Sc: Dr Ratan H Sagar.

CENTRAL MILITARY VETERINARY LABORATORY, Sardana Rd, Meerut Cantt.

COLLEGE OF VETERINARY SCIENCE, GB Pant Univ of Agri & Tech, Pantnagar 263145; Ph: 622, Gram: Pantvarsity. Dept of Pathology, Head: Dr N P Singh; Dept of Med, Head: Dr H C Joshi.

GOVERNMENT OF UTTAR PRADESH, AH Dept. Disease Investigation Laboratory, Lucknow 226007; Ph: 74699, Gram: Pashudhan; Jt Dir (Disease Control): Dr Bhupal Singh. VET POLYCLINICS: Lucknow, Muzzaffarnagar.

INDIAN VETERINARY RESEARCH INSTITUTE, Div of Pathology, Izatnagar 243122, UP; Ph: 74096, Gram: Vetexpath; Head: Dr P K Ramachandran Iyer; Scientists: Dr N S Parihar (Wild animals), Dr M C Prasad (Metabolic Diseases), Dr S K Chattopadhyay (Sheep Diseases), Dr O P Paliwal (Registry of Pathology), Dr Kalicharan (Clinical Pathology), Dr P R Vanamayya (Buffalo Diseases), Dr Ram Kumar (Goat Diseases), Dr A K Sharma (Cattle Diseases), Dr S C Gupta (Swine Diseases).

Western Region

GOA

GOVERNMENT OF GOA, Dte of AH & Vet Services, Disease Investigation Unit, Tonca-Caranzalem, Goa 403002; Ph: 2623; Disease Investigation Offr: Dr Saradindu Ray.

GUJARAT

COLLEGE OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, GAU, Anand Campus, Anand 388001; Ph: 3464, Gram: Gujvet. Dept of Pathology, Prof & Head: Dr D D Heranjal.

GOVERNMENT OF GUJARAT, Dte of AH, Krishi Bhavan, Paldi, Ahmedabad 380006; Ph: 79601, 79602, Gram: Pashupalan; Dep Dir (AH): Dr S T Pandya. Disease Investigation Laboratories — Dahod, Dist Panchmahals; Junagadh; Navasari; Premdarwaja, Dist Ahmedabad; Surat. VET POLYCLINICS — Baroda: Bhutdizampa; Junagadh: Horse Breeding Farm; Mehsana: Jagadish Chambers; Rajkot: National School Compound; Surat: Patelnagar; Valsad: Mumshivihar, Tithal Rd.

NATIONAL DAIRY DEVELOPMENT BOARD (NDDB), Animal Disease Diagnostic Laboratory, PB No 40, Anand 388001; Ph: 3002 to 3012, 3300 to 3303, Gram: Dairyboard, Tlx: 0172-207; Offr Incharge: Dr H S Naik, Epidemiologist; Parasitologist: Dr D K Singh; Rep Physiopathologist: Dr J S Patil; Sero-logist: Dr Satish Tongaonkar; Asst Execs: Dr P R S Raghav, Dr B K Singh, Dr M Thakur, Dr B C Varshney, Dr P K Bando-padhyay. Services: Disease diagnostic services in areas of gastro-intestinal parasitic infections such as nematodes, cestodes, trematodes, coccidia, etc; haemoprotozoan infections such as theileriosis, babesiosis trypanosomiasis, anaplasmosis, etc; cutaneous disorders such as mange, ringworm; metabolic disorders, deficiency diseases, urinary infections, poisoning, repeat breeding, infertility, endometritis, mastitis, enteritis, HS, rinderpest, cow and buffalo pox and post mortem examinations including histopathological studies in case of deaths, if any; outbreak investigation; on-the-spot diagnosis through mobile laboratory van; screening of animals for bovine tuberculosis, Johne's disease, brucellosis and mastitis; training of field veterinarians in collection, preservation and

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Intravenous Calcium
in exclusive P.V.C. Pouch

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CALVIB is exclusive
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Dose: 0.4 to 1.2 ml per kg/b.w.



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despatch of specimens for laboratory diagnosis; manpower development programme for disease diagnostic laboratories, etc. RESEARCH PROJECTS: Recognised as regional foot-and-mouth disease virus typing centre of All India Co-ordinated Research Project on FMD Epidemiology of the ICAR; Studies on Intracellular Blood Protista with particular reference to immunoprophylaxis against tropical theileriosis, in vitro cultivation of schizont infected bovine lymphoblasts and development of live tissue culture attenuated schizont vaccine against theileriosis, in vivo and in vitro chemotherapeutic trials with developing drugs, rearing of clean as well as infected tick colonies; immunofluorescence against theileriosis, Establishing repository of bacterial isolates from cases of mastitis, repeat breeders, diarrhoeal diseases, haemorrhagic septicaemia, etc; Bench-mark survey on diseases profile and mortality with resultant financial losses to farmers and the milkshed; Enhancement of milch animals productivity through herd health management; Bacteriological quality control of frozen semen and accessories; Biochemical studies on serum profiles for metabolic disorders and deficiency diseases; Serosurvey on abortion-causing agents particularly brucellosis, leptospirosis, IBR, chlamydia, blue tongue, BV D and Pl-3; Maintenance of various tissue cultures; Quality control services for milk and milk products with reference to microbes of public health significance.

MAHARASHTRA

BHARATIYA AGRO-INDUSTRIES FOUNDATION (BAIF), Research Inst of Anim Health, Off Pune-Nagar Rd, Wagholi, Dist Pune 412207; Ph: 70408-9, Gram: Baifon, Tlx: 0145-283; Chief Exec: Dr D S Gorhe; Gen Mgr: Dr N S Datt.

BOMBAY VETERINARY COLLEGE, Parel, Bombay 400012; Ph: 4131180, 4132792, 4137030, Gram: Bovet. Associate Dean: Dr P D Sardeshpande; Dept of Pathology, Head: Dr S M Niphadkar; Prof: Dr B V Jalnapurkar.

GOVERNMENT OF MAHARASHTRA, Dept of AH, Disease Investigation Section, Aundh, Pune 411007; Ph: 58474, 51421, Gram: Vet-research; Jt Dir Incharge: Dr D S Thakur; Asst Dir: Dr Mulla. Bacteriology — Dep

Dir: Dr S G Kulkarni; Asst Dirs: Dr Nimje, Dr Kapshikar; Pathology — Dep Dir: Dr G R Kamat; Asst Dir: Dr Jamorkar; Epidemiology — Dep Dir: Dr P V Kulkarni; FMD Epidemiology: Dr V N Herapanhalli; Asst Dir: Dr Thorat; FMD Lab, Dep Dir: Dr R S Kolhe; Asst Dir: Dr R S Meher; Toxicology, Dep Dir: Dr G K Chikhaljtkar; Asst Dir: Dr Mahishi; Paristology, Dep Dir: Dr D B Kulkarni; Asst Dir: Dr Athale; Cattle Diseases, Dep Dir: Vacant; Tissue Cultures, Dep Dir: Dr H R Kusurker. DIVISIONAL DISEASE INVESTIGATION LABORATORIES — Akola: Vet Polyclinic Compound, -444001; Asst Dir (Cattle): Dr Deshmukh; Aurangabad: Vet Polyclinic Compound, Khadkeshwar, -431001; Ph: 2053; Asst Dir (Cattle): Dr Kalyankar; Bombay: Mucosal Disease Controlling Unit, Anim Nutrition Laboratory, Aarey Colony, Goregaon, -400065; Ph: 692518; Res Offr: Dr Khandekar; Chiplun: c/o Dist Dep Dir of AH, -415605; Asst Dir (Cattle): Dr B N Kulkarni; Kolhapur: Vet Polyclinic Compound, Opp Maharajbaug, Sitabaldi, -440002; Ph: 22928; Asst Dir (Cattle): Dr Takarkhede; Nasik: Vet Polyclinic Bldg, Gole Colony, -422002; Ph: 3541; Asst Dir (Cattle): Dr P H Misal; Pune: DIS Aundh Compound; Ph: 58474, 51421; Asst Dir (Cattle): Dr Bhagwat. VET POLYCLINICS — Ahmednagar, Akola, Alibag (Raigad Dist), Amravati, Aurangabad, Beed, Bhandara, Bhivadi (Thane Dist), Bombay (c/o Bombay Vet Coll), Buldhana, Chandrapur, Chiplun (Ratnagiri Dist), Dhule, Gadchiroli, Jalgaon, Jalna, Kankavati, Kolhapur, Latur, Nagpur, Nanded, Nasik, Osmanabad, Parbhani, Pune, Sangli, Satara, Solapur, Wardha, Yectmal.

PUNJABRAO KRISHI VIDYAPEETH, Akola 444104; Ph: 5974, Gram: University; Faculty of Vet Sc, Dept of Bacteriology, Pathology & Parasitology; Head: Dr B L Purohit; Reader in Vet Pathology: Dr D L Paikre.

Southern Region

ANDHRA PRADESH

COLLEGE OF VETERINARY SCIENCE, APAU, Rajendranagar, Hyderabad 500030; Ph: 48164; Dept of Pathology, Offr Incharge (Disease Diagnosis): Dr S M Mohiuddin.

COLLEGE OF VETERINARY SCIENCE, APAU, Tirupati 517502; Ph: 2531; Dept of Pathology, Head: Dr P Rama Rao.

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You, more than anybody else, know how demanding poultry farming can be. So you can appreciate it when someone offers to take on your tensions during the crucial 72 weeks—when your birds are exposed to risks of disease, accident and even death.

That's what we'll do—relieve you of your worries for 72 whole weeks—with our comprehensive Insurance Policy. If you own a poultry farm consisting of 100 or more pure and/or hybrid chicks, hens and cocks, you can insure your birds from 0-72 weeks. Your birds can be covered against disease, accident or death due to several hazards.



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VETERINARY BIOLOGICAL & RESEARCH INSTITUTE, Govt of Andhra Pradesh, Shantinagar, Hyderabad 500028; Ph: 36356, Gram: Biovet; Jt Dir Incharge: Dr Krishna Ashrit; Jt Dir (Disease Investigation): Dr S Vasanth Rao.

KARNATAKA

AGRICULTURAL COLLEGE, UAS, Dharwad 580005. Dept of AH & Dairying, Head: Dr R B Patil; Vet Hospital.

GOVERNMENT OF KARNATAKA, Dept of AH & Vet Services -- VET POLYCLINICS: Bangalore, Hubli. VET HOSPITALS -- Bangalore: (i) Mysore Rd; Ph: 600985; Asst Dir Incharge: Dr V M Moogi; Asst Dir: Dr S S Hussain;

Surgeon: Dr K M Manjunath; Radiologist: Dr T Venugopal. (ii) Queen's Rd; Ph: 24211; Belgaum (Ph: 22802); Bellary; Bidar; Bijapur (Ph: 243); Challakere (Ph: 52); Chitradurga (Ph: 2824); Dharwad; Gadag (Ph: 8043); Gangawathi (Raichur Dist); Gulbarga; Hassan; Haveri; Hubli: Ph: 62153; Asst Dir Incharge: Dr M V Inamdar; Surgeon: Dr B N Gurudev; Radiologist: Dr V R Sompur; KGF; Karwar; Kodagu; Kolar; Kumta; Mandya (Ph: 192); Mercara (Ph: 805); Mysore: (i) City Vet Hospital; Ph: 23451; (ii) N R Mohalla; Ph: 24651; Raichur; Sagar; Sakaleshpur (Ph: 241); Shimoga; Sidhanur; Sirsi; Sonwarpet (Ph: 127); Tumkur.

INDIAN VETERINARY RESEARCH INSTITUTE, Southern Reional Station, Hebbal, Bangalore 560024; Ph: 30853, 32509, Gram: Vetex, Tlx: 845-439; Jt Dir-cum-Offr Incharge: Dr B U Rao.

INSTITUTE OF ANIMAL HEALTH AND VETERINARY BIOLOGICALS, Govt of Karnataka, Hebbal, Bangalore 560024; Ph: 362443, 361502, Gram: Anihealth; Dir: Dr B S Keshavamurthy.

NATIONAL DAIRY RESEARCH INSTITUTE, Southern Regional Station, Adugodi, Bangalore 560030; Ph: 579661-4, Gram: Dairysearch; Head: Dr S R Sampath, Ph off: 575119, resi: 565499.

SYSTEMATIC CONTROL OF DISEASES OF NATIONAL IMPORTANCE, 4th Main, Malleswaram, Bangalore; Ph: 360656; Offr Incharge: Dr Rafiq Anwar. Project: Surveillance, investigation and control of diseases.

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KERALA

COLLEGE OF VETERINARY & ANIMAL SCIENCES, Kerala Agril Univ, Mannuthy 680651, Trichur Dist; Ph: 22344; Dept of Pathology, Head: Dr A Ranjan.

GOVERNMENT OF KERALA, Dte of AH -- Chief Disease Investigation Laboratory, Palode, Pacha PO 695562, Trivandrum Dist; Chief Disease Investigation Offr: Dr M R Murugan. VET POLYCLINICS -- Alleppey Dist (i) Chengannur (Offr Incharge: Dr R Gopinathan Pillai), Haripad (Offr Incharge: Dr P Raveendran), Kayamkulam (Offr Incharge: Dr Abraham Oommen), Moncompu (Offr Incharge: Dr P M John), Shertallai

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PONDICHERRY

GOVERNMENT OF PONDICHERRY, Dte of AH, Disease Investigation Centre, Pondicherry 605001; Ph: 6135; Addl Dir: Dr R R Unnithan; Vet Asst Surgeons: Dr R Somasankaran Pillai, Dr Bhujanga Rao. VET HOSPITALS: Karaikal, Pondicherry.

TAMIL NADU

AGRICULTURAL COLLEGE & RESEARCH INSTITUTE, TNAU, Coimbatore 641003; Ph: 35461, Gram: Farmvar.

GOVERNMENT OF TAMIL NADU, Animal Disease Intelligence Unit, Bhuvanagiri 608601, South Arcot Dist: Cuddalore Clinical Laboratories; Coimbatore 641002: Clinical Laboratory, Vet Hospital; Hosur 635109, Dharmapuri Dist: Hosur Clinical Laboratory, Dist Livestock Farm; Kanchipuram 631501, Chingleput Dist: Kanchipuram Clinical Laboratory; Madurai 625002: Thallakulam Clinical Laboratory; Nagercoil 629001, Kanyakumari Dist: Nagercoil Clinical Laboratory; Orathanad 614625, Thanjavur Dist: Orathanad Clinical Laboratory; Pudukkottai 622001: Pudukkottai Clinical Laboratory; Ranipet 632401, North Arcot Dist: Vellore Clinical Laboratory; Saidapet 600015, Chingleput Dist: Madras Clinical Laboratory, Vet Hospital; Ph: 442082; Salem 636001, Salem Clinical Laboratory; Sivaganga 623560, Ramnad Dist: Sivaganga Clinical Laboratory; Sivaganga 627006: Tirunelveli Clinical Laboratory, Vet Hospital.

MADRAS VETERINARY COLLEGE, Vepery, Madras 600007; Ph: 31506, Gram: Vetdean; Dean: Dr P Kothandaraman; Head, Dept of Pathology: Dr R Ramakrishnan; Head, Extn Div: Dr M P Arumugam.

Central & Eastern Region

ANDAMAN & NICOBAR

GOVERNMENT OF ANDAMAN & NICOBAR, Dte of AH & Vet Services, Port Blair 744101; Ph: 2326; Disease Investigation Offr: Dr Balakrishnan.

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BIHAR

BIHAR VETERINARY COLLEGE, Livestock Research Station, Patna 800014; Ph: 24843.

MADHYA PRADESH

COLLEGE OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, JNKVV, South Civil Lines, Jabalpur 482001; Ph: 25302, Gram: Vetcol; Dept of Vet Pathology, Head: Dr J L Vegad; Scientists: Dr R P Awadhiya, Dr N K Jain & Dr A B Shrivastava.

COLLEGE OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, JNKVV, Mhow 453441; Ph: 222, 240, Gram: Vetcollege; Dean: Dr K S Johar; Incharge: Dr P G Supekar; Head, Extn Div: Dr R M Bakshi.

INSTITUTE OF DISEASE INVESTIGATIONS, R A K Vet Inst, Govt of MP, Jhangirabad, Bhopal; Ph: 63346, Gram: Pashuvikas Disease; Dep Dir of Vet Services (Disease Investigation): Dr Kataria. Laboratories: Ambikapur, Balaghat, Bilaspur, Chhindwada, Durg, Hazrat, Indore, Jabalpur, Khandwa, Mandla, Mandsaur, Raipur, Rajgarh, Rewa, Saugar, Shahdol, Tikamgarh.

MEGHALAYA

GOVERNMENT OF MEGHALAYA, Dte of AH, Disease Investigation Laboratory, Garikhana, Vet Compound, Shillong 793002; Ph: 4695.

NAGALAND

GOVERNMENT OF NAGALAND, Dte of Vet & AH, Disease Investigation Unit, Dimapur 797112; Ph: 849.

ORISSA

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SIKKIM

GOVERNMENT OF SIKKIM, AH Dept, Disease Investigation Laboratory, Veterinary Complex, Deorali, Gangtok 737102; Ph: 521.

TRIPURA

GOVERNMENT OF TRIPURA, Dte of AH, Disease Investigation Laboratory, Abhoynagar, Agartala 799005; Ph: 3528; Dep Dir of AH (RE): Dr A K Mazumdar. Also at Udaipur (Ph: 374), Dharmanagar.

WEST BENGAL

GOVERNMENT OF WEST BENGAL, Inst of Animal Health & Vet Biologicals, 37 Belgachia Rd, Calcutta 700037; Ph: 528032, Gram: Vetvax; Jt Dir Incharge: Dr J L Ganguly; Disease Investigation Offr: Dr P K Biswas; Research Offr: Dr S P Chandra Chowdhury, Ph: 527687. Disease Investigation-cum-Control Laboratories — Bankura Dist: 270 Schooldanga, PO Bankura; Ph: 382; Birbhum Dist: PO Suri; Ph: 252; Darjeeling: Ph: 2482; Jalpaiguri: Ph: 758; Malda: 'Singtala', Krishnajibon Sanyal Rd; Ph: 2407; Midnapore; Purulia: Ph: 514; West Dinajpur: PO Balurghat; Ph: 279. Disease Investigation-cum-Clinical Laboratories — Burdwan Dist: PO Bhatar; Cooch Behar Dist: PO Dinhata; Darjeeling: R N Sinha Rd; Res Offr: Dr J Samaddar, Ph: 2959; Hooghly: Serampur, PO Rishra; Midnapore Dist: PO Jhargram; Murshidabad Dist: PO Kandi; Nadia Dist: PO Ranaghat; West Dinajpur: PO Islampur. Ambulatory Clinical-cum-Diagnostic Laboratories — Burdwan: Ph: 2284; Calcutta: 1, K S Roy Rd, New Secretariat Bldg, -700001; Ph: 236271 Ext 332; Nadia Dist: Dep Dir of Vet Services, Presidency Div, Administrative Bldg, PO Kalyani; Ph: 211; Siliguri: Jalpaiguri Chetri Bhavan, Pradhannagar; Ph: 223355.

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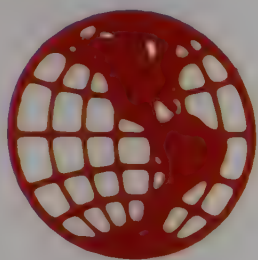
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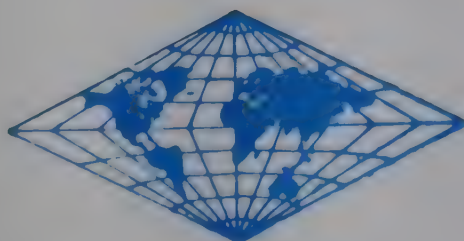
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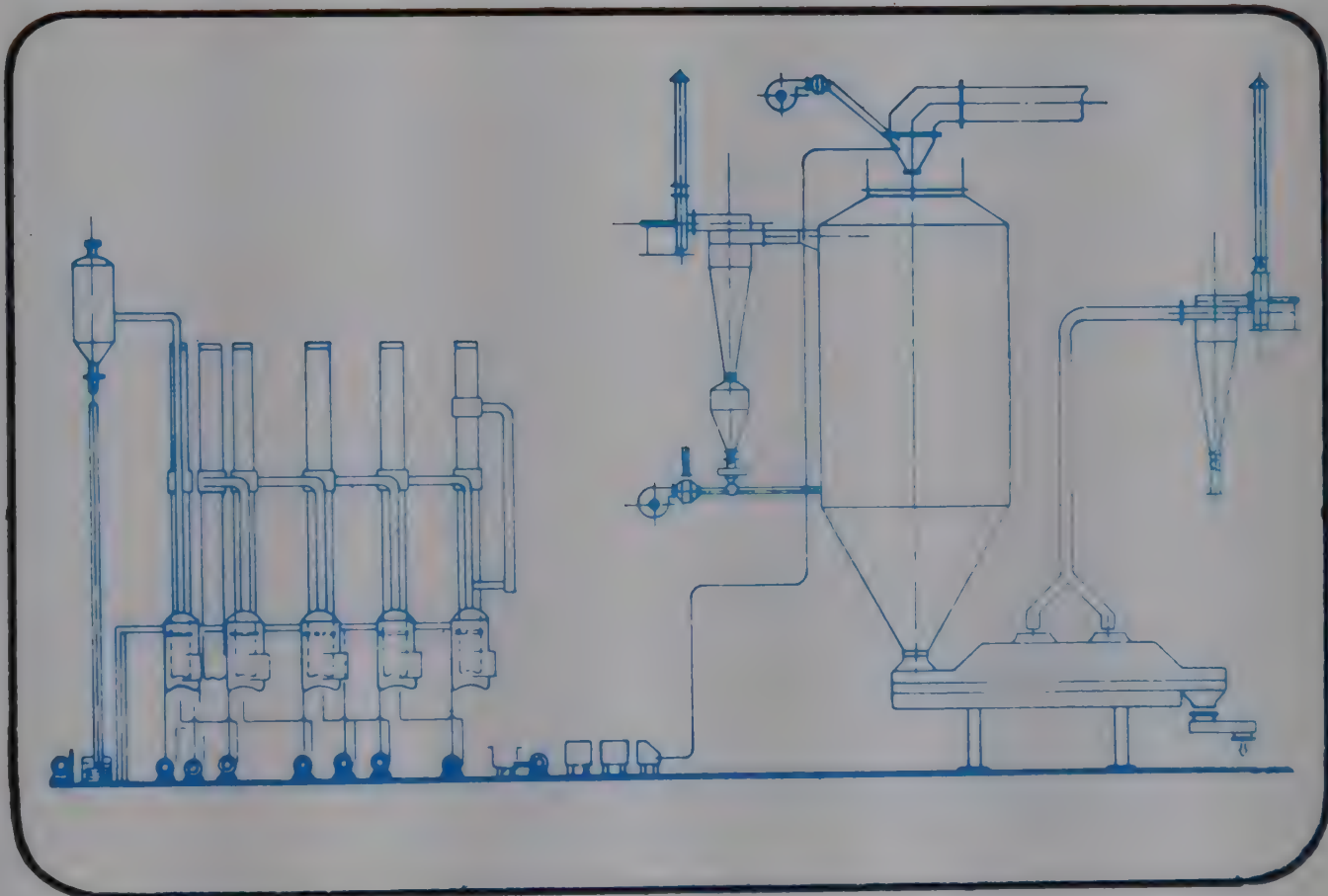
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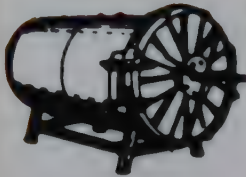
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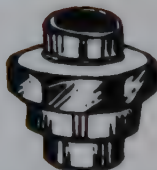
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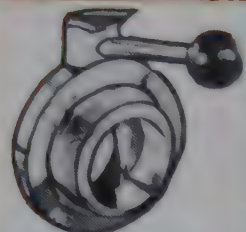
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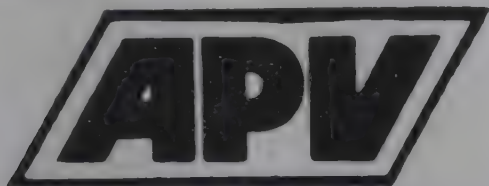
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A1 INDUSTRIES, Engineering Div, M Vasanthi Rd, J B Nagar, Andheri (E), Bombay 400059; Ph: 6329972, 6324065, Gram: Aquasoft; Mg Partner: R V Chheda; Gen Mgr (Sales & Service): M T Kothari; Consultant (Water & waste water): Pra-deep Chheda. Product: Water & waste water treatment plants. Brand Name: Aquasoft.



APV-TEXMACO LIMITED, 2 Jessore Rd, Dum Dum, Calcutta 700028; Ph: 572717 (4 lines), Gram: Apvec, Tlx: 021-2538; Mg Dir: Sujit Chakravarty, Ph off: 573741, resi: 468305, 469495; Tech Mgr: P S Woodley; Mktg Mgr: S K Ghosh, Ph (resi): 527262; Sales Mgr: S Ranjan; Dairy Technologist: S K Kaushal. Branches — Bombay: 245-A Dr A B Rd, Worli, -400025; Ph: 4935746, Gram: Apvecbom, Tlx: 011-71041; Branch Mgr: S S Das; Madras: Chordia Mansion, Mount Rd, -600002; Ph: 81506, Gram: Apveng, Tlx: 041-408; New Delhi: 305 Vishal Bhawan, 95 Nehru Place, -110019; Ph: 6431929, 6416311, Gram: Apvdel, Tlx: 031-3837; Divl Mgr: Rajinder Batra, Ph (resi): 2528134; Asst Sales Mgr: M A Bokil. Products: CIP system for dairy plants, fabrication of aluminium and other non-ferrous materials, flow control devices, ice-cream freezers, pipe fittings, plate and tubular heat exchangers, plate evaporators for concentration of milk, power blenders and sifters, processing plants: cheese, chilling milk, pasteurization of milk, yogurt, storage tanks, UHT plants.



A T E PRIVATE LIMITED, Stork Dairy Division, 43 Dr V B Gandhi Marg, Fort, Bombay 400023; Ph: 244771, Gram: Coratex, Tlx: 011-2118 ATE IN; Mg Dir: Atul K Bhagwati; Mgr (Ops): Parag J Rele. Regl Offices: Ahmedabad, Bombay, Calcutta, Coimbatore, New Delhi. Product: Milk processing eqpt. Brand Name: Stork.

ACME MANUFACTURING CO LTD, Khandelwal Udyog Div, Kurla Kirol Rd, PO Ghatkopar (W), PB No 9208, Bombay 400086; Ph: 5133191, 5133123; Mg Dir: Ashok J Patel; Chief Exec: B D Khandelwal, Ph off: 5133442. Product: Liquid nitrogen plants.

ADCON ELECTRONICS PVT LTD, 'Ashirwad', 31/1 South Tukoganj, Indore 452001; Ph: 21131, 4621, Gram: Adcon, Tlx: 0735-224 AEPL IN; Mg Dir: A K Pandey. Products: Auto transformer starters, control panels, D G sets, voltage boosters.

ADVANCE ELECTRONICS, Subhash Rd, Opp Telegraph Office, Anand 388001; Ph: 1378. Products: Control transformer, electronic vibrofeeder for feed plant.

ADVANCE TUBE CO, THE, 99 Nagdevi St, Bombay 400003; Ph: 323522, 376349; Mg Partner: Dipak R Dani. Product: Boiler tubes.

AIR FLOW PVT LTD, 13/1090 Hardhian Singh Rd, Karol Bagh, New Delhi 110005; Ph: 561236, 567286, Gram: Sheetequip, Tlx: 031-4525 AFPL IN. Products: Reaction kettles, tanks, vessels, heat exchangers, jacketed chimney.

AJAY & ABHAY (P) LTD, B-84/1 Okhla Indl Area II, New Delhi 110020; Ph: 636539,

See also LATE ADDITIONS at the end of the listing

UNITECH MACHINES LIMITED

Regd. Office:

B-211 Chittaranjan Park, New Delhi 110 019

Phones: 6414896, 6431155 • *Telex:* 031-4750

Works:

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Phone: 7370 • *Telex:* 596206 TECH IN

●

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Tanks, Silos, Milk Pasteurization Plants,
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Ghee Boilers, Heat Exchangers, Cream Tanks,
Complete Milk Chilling Plants on Turn-key Basis,
Casein Making Equipments, etc.

●

Tlx: 031-65184; Chief Exec: S C Jaipuria,
Ph off: 633010, resi: 6419207. Products:
Milk packaging machines.

ALFA-LAVAL (INDIA) LIMITED, Dapodi, Pune
411012; Ph: 86321 (6 lines), Gram:
Nordic, Pune, Tlx: 0146-219, 0146-259;
Mg Director: Mrs L F Poonawalla; Gen
Mgr (Food Engineering): G K Nambiar.
Area Offices — Bangalore: 47/4 Promen-
ade Road, -560005; Tlx: 0845-8789;
Area Mgr: A Hejmadi; Bombay: Mustafa
Building, 7A Sir P M Road, -400001; Ph:
2861369, Gram: Nordic, Bombay; Tlx:
011-4108, 011-4384; Area Manager: S
Srivastava; Calcutta: 10 Ho Chi
Minh Sarani, -700071; Ph: 445906,
448850, Gram: Skandia, Tlx: 021-3508;
Area Mgr: S Nagarajan; New Delhi: Allah-
abad Bank Building, 17 Parliament St,
-110001; Ph: 311960, 323777, Gram:
Nordic, Tlx: 031-63071; Area Mgr: Satish
Tandon. Branch Offices — Baroda: Nirali
Apartments, Near Atma Jyoti Ashram, Race
Course Circle, -390007; Ph: 320716; Mgr:
A K Mittal; Madras: 1 Wallace Gardens,
First Street, -600006; Ph: 479061,
479063, Gram: Nordic, Tlx: 041-464; Mgr:
N Chandrasekhar. Foreign Principals:
Alfa-Laval AB, Sweden; APV-Anhydro A/S,

Denmark; Kustner SA, Switzerland; Simon
Freres, France. Products: Alluminium milk
cans, centrifugal pumps, compressors, farm
seperators, hermetic centrifugal sepe-
rators, ice-cream plants, instant milk
chilling plants, milk tankers, multistage
evaporators, pasteurizers, refrigeration
plants, spray dryers, ss storage tanks
and vessels; cook, mould, wrap and pack
cheese, butter, margarine, etc; ss valves
and pipe fittings; yoghurt plants; complete
plants for indigenous milk products like
Shrikhand, khoa, etc; Total turnkey engi-
neering projects undertaken.

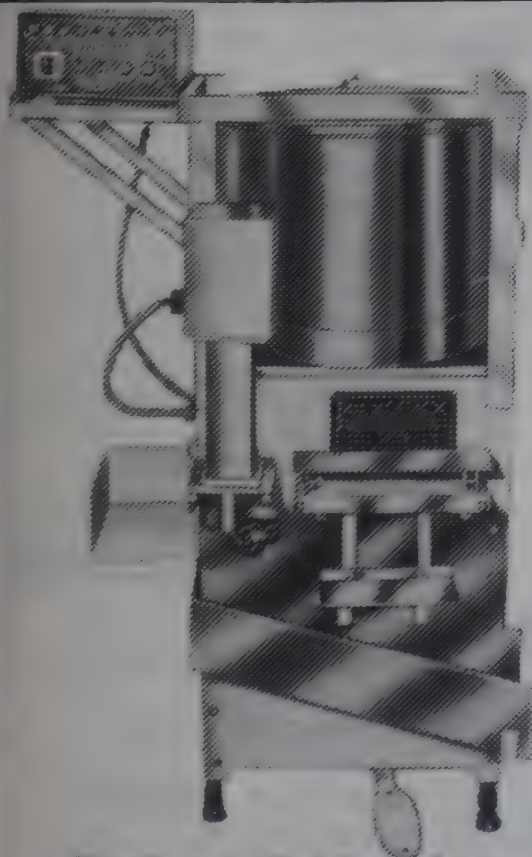
ALIN ENTERPRISES, W-72, 'S' Block MIDC Indl
Area, Bhosari, Pune 411026; Ph: 84006;
Prop: Ramesh Hosmane. Products: CIP tanks,
milk reception eqpts, silos, storage tanks.

ALPS INDUSTRIES, M G Rd, Anand 388001; Ph:
1319; Prop: A M Patel, Ph (resi): 3044.
Products: SS milk collection tray.

ALPA TRADERS, C-10 Deshmukh Wadi, Zaver Rd,
Mulund (W), Bombay 400080; Prop: Jagdish.

AMERICAN REFRIGERATOR CO LTD, Sadhana, Rayon
House, Dr D N Rd, Bombay 400001; Ph:
265671; Regl Dir: Mrs R S Jalan. Products:
Refrigeration Plants.

AMI ENTERPRISES, 84 Bhuleshwar Rd, Bombay
400002. Product: Ear tags.



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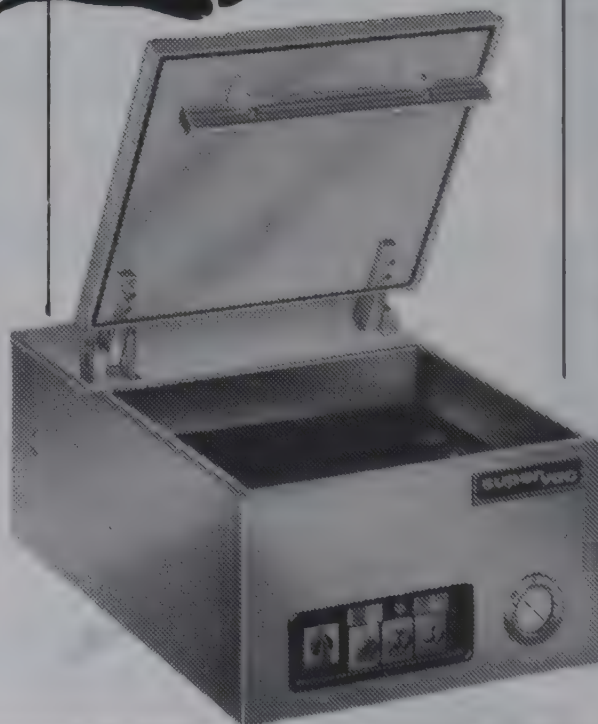
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Thrice the normal shelf life—that's what vacuum packaging can achieve. A revolutionary concept, vacuum packaging has now been brought to India by Bhagwati Supervac Pvt. Ltd., an Indo-Austrian venture. Packed foods can now stay fresh and appetising over longer periods. Be it cheese and dairy products, spices, meat, marine products, ready foods and more!

Enhanced shelf life is not the only advantage of vacuum packaging . . . it's packed with benefits, guaranteed to make you give up conventional packaging . . .

- Enhanced shelf life
 - No weight loss due to dehydration
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- Vacuum packed products can be stored under refrigeration between 0°C to 50°C.
- Retains aroma longer
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 - Better sales appeal

What's more, if you are a cheese manufacturer, there's another juicy bit of news for you . . . curing of cheese can be done in the vacuum package itself! No rind formation. No scraping needed. And no moisture loss during curing. Result: No loss of weight!



Very popular abroad, vacuum packaging machines will soon be manufactured in India by Bhagwati Supervac Pvt. Ltd. Bhagwati is one of the leading manufacturers of industrial machineries, while Supervac has been in the vacuum packaging line for more than 25 years!

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Company : _____

Address : _____

Product/s manufactured : _____

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Ahmedabad - 380 009

Phone : 442466

Telex : 0121-630 BHAV IN

Gram : BHAVICAST

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AMORA CHEMICALS PVT LTD, Suraj Plaza, Maganwadi, Sayajigunj, Vadodara 390005; Ph: 66691-3; Dirs: Bhupinder Patel, Utkarsh Patel. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

ANAND DAIRY MACHINERY CO, 50 GIDC, Vithal Udyognagar 388121, Gujarat; Ph: 7692, Gram: Anandairy; Partner: Mrs Priti N Shah. Products: Dairy vessels, tanks, scrubbers, etc.

ANAND MOTAR AGENCIES LTD, 21 Vidhan Sabha Marg, Lucknow 226001; Ph: 45603, 43122; Mg Dir: A P Agarwalla. Product: Road milk tankers.

ANIK DAIRY EQUIPMENTS, Plot No 8, S No 169-A/A, Govt Colony Rd, Kupwad, Maharashtra; Prop: Dilip C Bhate. Product: Dairy equipment.

APURVA ENGINEERING WORKS, Chaphekar Wadi, Near Gopalji Hemraj High School, Borivli (East), Bombay 400066; Ph: 654601, 652235; Prop: Suresh Chapekar.

ARKAY ENGINEERING ENTERPRISE, 319 Mount Rd, Nandanam, Madras 600035; Ph: 450122, 452248; Prop: R K Nair. Products: Weighing equipment. Brand Name: Arkay.

ARMCESS ENGINEERS PVT LTD, Super A-8 & 9, Indl Estate, PB No 3204, Madras 600032; Ph: 432616; Mg Dir: John Prasad. Product: Feed plant equipment.

ARO-GARD ENGINEERING, 689 GIDC, Makarpura, Baroda 390010; Ph: 42008; Mg Partner: Ajay N Desai, Ph: 42766. Products: Accumulation tables, butter trolleys, can washers, conveyors-salt/belt/screw/chain belted, powder sifters, urea-mollasses animal lick plants. Brand Name: Rota-sift.

ASHOK LEYLAND LIMITED, Marketing Div, 480 Anna Salai, Nandanam, Post Bag No 1305, Madras 600035; Ph: 451356, Gram: Ashley, Tlx: 041-6722; Mg Dir: R J Shahaney;

Exec Dir (Sales & Mktg): R Jagannath.

Regl Offices -- NORTHERN REGION --

Chandigarh Branch: 37 Sector 26-D, Madhya Marg, -160026; Ph: 27603, 25037, Gram:

Leyland; Lucknow Branch: 9 Rani Lakshmi Bai Marg, -226001; Ph: 45470, 48468, Tlx:

Ashleyluck; New Delhi (Regl Off): 88 Tej Bldg, Bahadur Shah Zafar Marg, -110002;

Ph: 3311652, 3318809, 3319305, Gram: Ashley, Tlx: 031-65941. EASTERN REGION --

Calcutta: 'Benson House', 1 Auckland Place, -700017; Ph: 432592, 435916,

448578, Gram: Ashleyern, Tlx: 021-3410.

WESTERN REGION -- Bombay: Electric Mansion, Appa Saheb Marathe Marg, Prabha-

devi, -400025; Ph: 4229493, 4225076, 4227860, Gram: Ashleywest, Tlx: 011-71666.

CENTRAL REGION -- Nagpur: 92 Canal Rd,

Ramdaspath, -440010. SOUTHERN REGION -- Madras: 480 Anna Salai, Nandanam, -600035;

Ph: 451356, Gram: Ashley, Tlx: 041-6722. Product: Road milk tankers.

ASSOCIATED ENTREPRENEURS & ERECTORS (I) PVT LTD, 412 Mansarovar Bldg, 90 Nehru Place,

New Delhi 110019; Ph: 6418224, Gram:

Powerplant, Tlx: 31-62320 ANU IN Attn:

AEE; Mg Dir: Dipen Datta. Godown: 67,

Rampuri, Near Kalkaji Extn, New Delhi

110019. Branches -- Calcutta: 32 Creek

Row, -700014; Ph: 267829, Tlx: 021-407;

Chmn: Dilip Datta; Hyderabad: -9-4-134/3

Toli Chowki, -500008; Gram: Powerplant.

Products: Cable trays, control panels,

current transformers, fuse fittings,

voltage stabilizers; Execute different

electrical, mechanical dairy projects on

turnkey basis. Brand Name: AEE.

AVERY INDIA LTD, 28/2 Waterloo St, PB No

377, Calcutta 700069; Ph: 238121, 234671,

Tlx: 021-7457; Mg Dir: S K Niyogi; Sales

Mgr: G A McLaren. Products: Cart weigh-

bridges with cattle pen, milk weighers.

Brand Name: Avery.

B I INDUSTRIES, 22-1-1040/9 Darulshafa Main

Rd, Hyderabad 500024; Ph: 520752; Prop:

Iqbal Ali Khan, Ph (resi): 234716; Works

Mgr: Syed Zaheeruddin. Branch off: Bombay.

Products: Automatic cotton seed hulls,

turneric, besan. feed mixing plants.

BAKUBHAI AMBALAL, Ahmedabad House, 15 Wal-

chand Hirachand Marg, Ballard Estate,

Bombay 400038; Ph: 268572, 260419, Tlx:

011-75779 ASE IN. Branches: Ahmedabad,

Baroda, Calcutta, Coimbatore, Hyderabad,

Indore, Madras, New Delhi. Products: FFS

machines (Acma, Italy), Dairy products

wrapping machines (Corazza Natalino,

Italy) and other packaging machines.

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BAVIA MILK INDUSTRIES PVT LTD, 8062
Bavipatti Rd, Decurated 500003;
Ph: 73527, 70223, Gram: Barolia; Mg
Dir: P B Barolia; Dir: Sunder Bantia.
Factory & Adm Off: 14 New Bhoiguda,
Decurated 500003; Ph: 73524. Pro-
ducts: Dump tanks, ghee settling tanks,
insulated milk storage tanks, milk
weighing eqpt, road tankers.

BATLIBOICO & COMPANY LTD, Apesjay House, 6th
Floor, Dr V B Gandhi Marg, Fort, Bombay
400023; Ph: 243823, Gram: Batliboico,
Tlx: 011-2284, 011-4852; Mg Dir: Nirmal
Bhogilal; Sr Dir (CS): G V Choksi.
Branches: Ahmedabad, Calcutta, Coimba-
ture, Delhi, Ernakulam, Indore, Jaipur,
Jamshedpur, Lucknow, Ludhiana, Madras,
Patna, Secunderabad, Vijayawada. Pro-
ducts: Machine tools, agricultural eqpt,
air-conditioning and refrigeration eqpt,
power plants, generating sets, effluent
treatment plants and water pollution
control systems, process control and
analytical instruments, air control and
purification equipment.

BESTOZELL INDIA LIMITED, Grosvenor House,
21 Camac St, Calcutta 700016. Products:
Temperature controllers.

BHANDARI MANUFACTURING WORKS, A-9, Sector-5,
NOIDA, Dist Ghaziabad, UP; Ph: 805-3003,
805-3967, 805-4047; Head Off: A-34
Friends Colony, New Delhi 110065; Ph:
636150, 2526626 (PP); Partners: Anil
Bhandari, Anup Bhandari. Products: Butter
churns, cream separators, milk testing
eqpt. Brand Names: Tina & International.

BHARAT RAILWAY MOTORS LTD, 266-1 Dilbaugh
Villa, Near Eshita Apartment, Navrang-
pura, Ahmedabad 380009. Product: Rail/
road tankers.

BHARAT ELECTRIC & ENGINEERING CORPORATION,
21 Lalal St, Fort, Bombay 400001; Ph:
274143, 271134, Gram: Golegra. Products:
Electrical motors, water pumps.

BHARAT HEAVY PLATE & VESSELS LTD (A Govt of
India Undertaking), BHPV PO, Vinakha-
patnam 530012, AP; Ph: 7381, 7621, Gram:
Heavyvells, Tlx: 0495-213/313 BHPV IN;
Chmn & Mg Dir: M B Naidu; Gen Mgr (Cryo):
K Raghavaiah; Mgr (Cryogenic Comm): M S
Sastry. Branches — Bombay: 32-F Maker
Towers, Cuffe Parade, Colaba, -400005;
Ph: 216891, 213349, Tlx: 011-3304; Chief
Mktg Mgr: V K Raman; Calcutta: 8 Camac
St, -700017; Ph: 433906; Sr Resident
Engr: S K Dutta; Madras: 5 State Bank St,
Mount Rd, -600002; Ph: 840987; Dep Mgr
(Comm Liaison): R Subrahmanyam; New

Delhi: 3-D Hansalaya, Barakhamba Rd,
-110001; Ph: 3313763, 3312123, Tlx:
031-2839; Dep Mgr (Comm Liaison):
T A Matrai. Products: Pressure vessels,
heat exchangers, boilers, storage spheres,
storage tanks, air and gas separation
plants, cryo-biological containers,
digesters, paper and pulp equipment,
titanium substrate insoluble anodes,
fin tubes, individual quick freezing
units, etc. Brand Name: BHPV.

BHARAT PROCESS & MECHANICAL ENGINEERS LTD
(A Govt of India Undertaking), Chartered
Bank Bldg, PB No 46, Calcutta 700001;
Ph: 222351, Gram: Popinjay, Tlx: 7222,
7633; Mgr (Sales Coord): A K Dutta.
Branches: Bombay, Kanpur, Madras, New
Delhi. Products: Condensers, coolers,
crystallisers, diaphragm valves, feed
plant eqpt, heaters, heat exchangers,
material handling eqpt, ss vessels,
water treatment plant.

BIMAC MACHINES PVT LTD, 915 Dalamal Tower,
Mariman Point, Bombay 400021. Product:
Coextruded multilayer film manufacturing
plants.

BLUE STAR LTD, Corporate HQ, Kasturi Bldg,
Jamshedji Tata Rd, Bombay 400020; Ph:
2020868; Chmn & Chief Exec: Ashok M
Advani; Pres & Vice-Chmn: Suneel M Advani.
Divisional HQ: Sahas, 414/2 Veer Savarkar
Marg, Prabhadevi, Bombay 400025; Ph:
4306155, Gram: Frostblue, Tlx: 011-71193,
71051; Dir: H M Jhangiani. Western Regl
HQ: Band Box House, Prabhadevi, Bombay
400025; Ph: 4933101; Regl Vice-Pres: C L
Madan. Products: Air-conditioning and
refrigeration plants and products.

BRIMCO PLASTIC MACHINERY PVT LTD, 55 Govt
Indl Estate, Charkop, Kandivli (West),
Bombay 400067; Ph: 695351, 697066; Mg
Dir: Anil B Goradia. Product: Coextruded
film manufacturing plant.

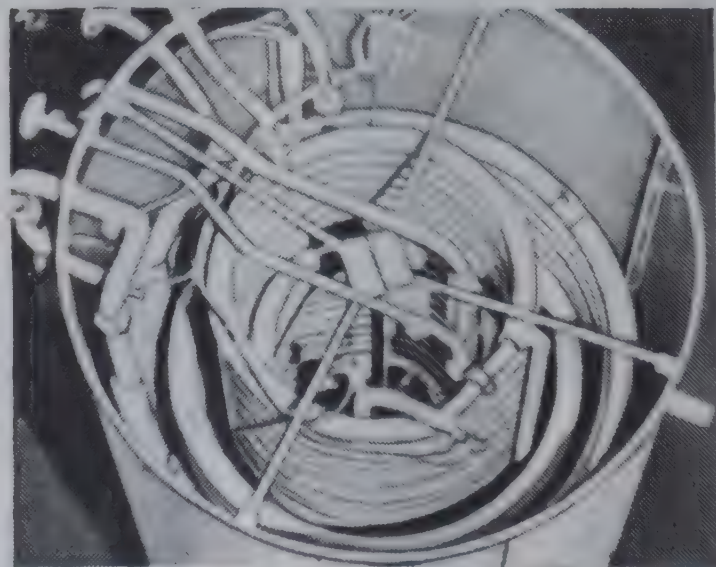
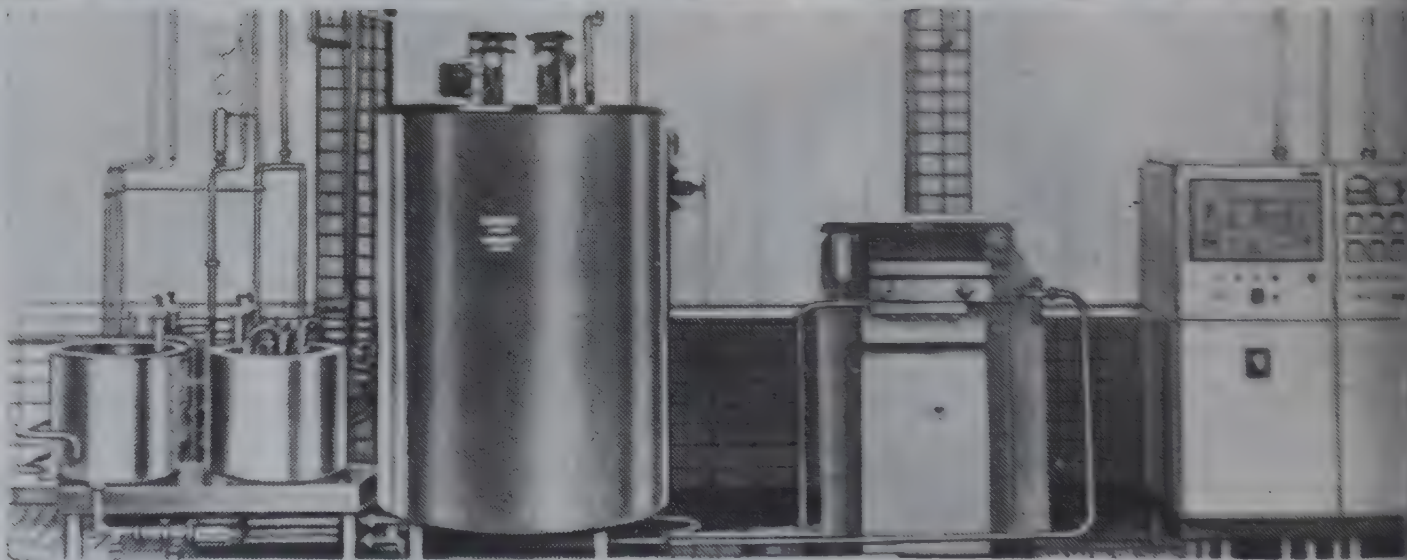
BURN STANDARD COMPANY LTD (A Govt of India
Undertaking), 10-C Hungerford St, PB No
191, Calcutta 700017; Ph: 441067, Gram:
Burnwagon, Tlx: 021-2795. Product: Milk
tankers.

C Z INSTRUMENTS INDIA PVT LTD, 35 New Marine
Lines, PB No 11108, Bombay 400020; Ph:
254208, Tlx: 011-3065; Dir: Mayur Patel.
Products: Analytical/laboratory eqpt.

C DOCTOR & CO (P) LTD, 11 Homi Mody St, Fort,
Bombay 400023; Ph: 274538. Products: Chil-
ling/refrigeration plants.

CALOREX (INDIA) PVT LTD, M/7 Doctor's
Quarters, Jail Rd, Baroda 390001.
Product: Boilers.

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Tel: 633111, 632058. Telex: 031-61415 DIPL IN, Cable: PASHUSEVA

CAPITAL ELECTRONICS, Vitrag, Opp Swastik Society, Mahavir Marg, Anand 388001; Mg Partners: A P Vora, R A Vora.

CAPITAL PROJECTS AND ENGINEERING, C-35 Rama Rd, New Delhi 110015; Ph: 538367, 532795; Mg Partner: Koldie Ghai. Products/Services: Turnkey installation of industrial refrigeration plants, ice-cream plants, chilling plants, cold storages, blast freezers. Brand Name: Capital.

CAPITAL SCIENTIFIC INDUSTRIES, Amul Dairy Rd, Anand 388001; Ph: 3058; Partner: A B Pandya. Product: Milk testing eqpt, scientific glass apparatus.

CHADHA SALES PRIVATE LIMITED, 137 Rajindra Market, Tis Hazari, Delhi 110054; Ph: 2511416, 2518477, Tlx: 31-63194 CHDA IN; Mg Dir: M P S Chadha, Ph (resi): 7119050. Products: Aluminium seamless cans, brushes, butter churns, caps, centrifuges, cream separator spares, laboratory eqpt, lock stoppers, milk testing eqpt, sampling appliances, sealing accessories, strainers, thermometers, electronic milk testers.

CHANDRA INDUSTRIES, G T Rd, Jalandhar City 144001; Ph: 3284, 5843. Products: Refrigeration eqpt, Ice cream cabinet.

CIMMCO INTERNATIONAL, Prakashdeep, 6th Floor, 7 Tolstoy Marg, New Delhi 110001; Ph: 3310814, Gram: Cimwag, Tlx: 31-62294; Sr Mktg Mgr: G P Mathur. Factory: Bharatpur, Rajasthan. Products: Underframes for Rail Milk Tankers.

CONTINENTAL ENTERPRISES, ED-135/1 Tagore Garden, New Delhi 110027; Ph: 537904, 5412353, Gram: Indusaid; Mg Partner: G B S Bir, Ph (resi): 593050, 593841. Products: Dairy plant spares, equipments and stainless steel pipe fittings, etc.

CONTINENTAL INSTRUMENTS (INDIA), Timber Market, Ambala Cantt 133001; Ph: 22829; Partner: Rajeev Jain; Production Mgr: P K Jain. Product: Milk testing eqpt.

COOL MORE INDUSTRIES, H-43 Udyog Nagar Indl Area, Rohtak Rd, New Delhi 110041; Ph: 565195; Ptnr: J S Kalsi, Ph (resi): 531911.

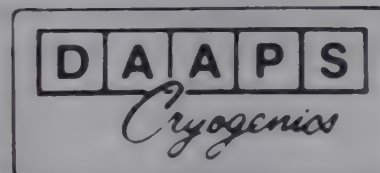
CORONET CONTROL DEVICES, Deonghat, Solan 173211, HP; Ph: 860, Gram: Coronet; Dir: Ashok K Garg.

CREMACH DESIGNS, 893/4, GIDC Indl Estate, Makarpura, Baroda 390010; Ph: 42963, Gram: Cremach. Products: Cattle feed plant equipment, Lick block plant, mineral mixture plant, feed pulveriser, blenders, molasses mixers, pelleting machines.

CROMPTON GREAVES LIMITED, Mistry Chambers, Cama Hotel Rd, Khanpur, Ahmedabad 380009. Products: Control panels/switchboards.

D G S COMPANY, 13 GIDC, PB No 16, Vithal Udyognagar 388121, Gujarat; Ph: 3216, 7165, 7463, Gram: Dijisha, Anand; Mg Partner: D G Shah. Products: Small dairy equipments and machinery spare parts.

DAARS BREEDING PRODUCTS PRIVATE LIMITED, D-117 Okhla Industrial Estate, Phase I, New Delhi 110020; Ph: 633111, 632058, Gram: Pashuseva, Tlx: 31-61415 DIPL IN; Chmn & Mg Dir: Maj-Gen (Retd) S P Vohra, PVSM, Ph (resi): 672227; Jt Mg Dir: Anil K Vohra, Ph (resi): 676443; Works Mgr: Lt Col (Retd) Vinod Bedi, Ph (resi): 656925; Sales Mgr: K V Skaria, Ph (resi): 5438329. Plants — (i) A-8 DSIDC Indl Complex, Nangloi, Delhi 110041; Ph: 87388; (ii) D-117 Okhla Indl Estate, Phase I, New Delhi 110020; Ph: 633111, 632058, Gram: Pashuseva, Tlx: 31-61415 DIPL IN. Foreign Principals: Instruments De Medecine Veterinaire, France (AI, ET & Laboratory equipment). Products: AI guns, Ear tags, sheaths for AI guns and other AI consumable equipment.



DAARS CRYOGENICS PRIVATE LIMITED (DCPL), 17-E Community Centre, Basant Lok, Vasant Vihar, New Delhi 110057; Ph: 676468, 679427, Gram: Cryodap, Tlx: 31-62613 DAPS IN; Chmn: Maj-Gen (Retd) S P Vohra, PVSM, Ph (resi): 672227; Mg Dir: Mrs Vanita Vohra, Ph (resi): 673027; Works Mgr: P R Ramachandran, Ph (resi): 21490 (Gurgaon); Comml Mgr: Satish Bansal, Ph (resi): 23946 (Gurgaon); Mktg Mgr: T Chatterjee, Ph (resi): 6419840. Cryo-Biological & Industrial Cryogenic Containers Plant: Plots A-348 & 349, Bhiwadi Indl Estate, Bhiwadi 301019, Dist Alwar, Rajasthan; Ph: 143, 174, Gram: MVE IND. Collaborator: Minnesota Valley Engg (MVE), USA. Products: Semen Storage/Liquid Nitrogen Transportation Containers and Vertical Caseous Liquid Containers.

DAFFOO INDUSTRIES, T-464/1 Baljit Nagar, New Delhi 110008; Ph: 5717283, Gram: Downtemp; Chief Exec: H B S Daffoo. Products: Ice cream plant.

DAIRY APPLIANCES COMPANY, 2824 Idgah Rd, Sadar Bazar, Delhi 110006; Ph: 520040,

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520008, Gram: Centrifuge; Prop: Subhash Chand Singhal, Ph (resi): 263079. Products: Cream separators, milk testing equipment. Brand Name: Modern.

DAIRY DEN (INDIA) PRIVATE LIMITED, 25 Madhuvan, Ellisbridge, Ahmedabad 380006; Ph: 461205, Tlx: 121-663 URMI IN. Product: Ice cream machines.

DAIRY EQUIPMENT COMPANY, 111 Wadala Udyog Bhavan, Wadala, Bombay 400031; Ph: 4129127, 4120201, Gram: Dairyequip; Mg Partners: D M Doshi, R D Doshi, A D Doshi, Ph (resi): 542476. Associate: Doshi & Sons, PB No 14, Anand 388001; Ph: 1384, Gram: Doshisons; Mgr: J M Doshi. Products: Bottling eqpt, butter making eqpt, foil caps for bottles, milk testing eqpt. Brand Name: Deco.

DAIRY MASHKIN FABRIK, 154 GIDC, Vithal Udyognagar 388121, Gujarat; Ph: 7692, Gram: Dairy, V V Nagar; Mg Partner: K D Shah. Products: Brushes, can scrubber, conveyor chains, milk pumps, shaft seals, small dairy equipments.



DATCO

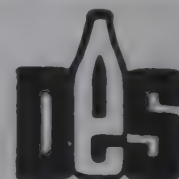
DAIRY TRADING CORPORATION, 12 Mangesh Senoy Rd, Fort, Bombay 400001; Ph: 260529, 261765, Gram: Milkochurns; Mg Partner: H J Dharamsey, Ph (resi): 261765; Partner: M Mendonca; Sales Exec: Nitin Dharmsey. Product: Milkopack semi-automatic poly bag filler and sealer. Brand Names: Datco & Milkopack.



DAIRY UDYOG, Ghatkopar Indl Estate, Block C, Unit No 229A/230A, 2nd Floor, Lal Bahadur Shastri Marg, Ghatkopar, Bombay 400086; Ph: 586878, 584960, 583636, Gram: Dairyudyog; Partners: Ramesh D Zaveri, Satish F Daftary. Products: Dairy appliances, milk containers, milk weighing/sealing/sampling eqpt, butter/cheese/casein making eqpt, bottling eqpt, milk can scrubber, milk testing eqpt, milk chilling units, ice-making plants.



DANY DAIRY & FOOD ENGINEERS LIMITED, 7/4 Km Stone, Dehradun Rd, PB No 115, Saharanpur 247001; Ph: 7003, 7383, Gram: Delf, Tlx: 0596-244 DELF IN; Mg Dir: M M Malik; Dir: K K Mathur; Works Dir: S S Taneja; Gen Mgrs: K L Arora, Arun Kumar. Branch: M-26 Commercial Complex, 1st Floor, Greater Kailash-II, New Delhi 110048; Ph: 6413902, Tlx: 031-66877 DANY IN. Products: Complete plants for food and dairy industry; also Dump tanks, weigh bowls, chillers, HTST pasteurisers, UHT Plants, cream separator/pasteuriser, ghee kettle, butter churn, evaporators, spray dryers, Effluent treatment eqpt, Road Milk Tankers, storage tanks, Farm cooling tanks and complete chilling centre eqpt including refrigeration plants. Brand Name: DDFE.



DAYRY ENGINEERING SERVICES PRIVATE LIMITED, 14 N P Developed Plots, Ekkattuthangal, Madras 600097; Ph: 431639; Mg Dir: M R Prasad, Ph (resi): 423165. Products: Milk pumps, SS pipes and pipe fittings (bends, tees, unions, reducing liners), Valves (two/three way, pneumatic, expanders).

DEVANG CORPORATION, Plastic Div, J/4 Bhang Wadi, Kalbadevi Rd, PB No 2086, Bombay 400002; Ph: 252858; Prop: Pankaj Shah. Products: Milk testing equipment, bottles and teflon wares. Brand Name: DC.

DOSHI & SONS, Subhash Rd, PB No 14, Anand 388001; Ph: 84, 1384, Gram: Doshisons; Partner: J M Doshi. Products: Aluminium caps, bottling eqpt, cream separators, cans, lab eqpt, milk testing eqpt. Brand Name: Deco.

DR FROEB KG, D-17 Panchsheel Enclave, New Delhi 110017; Ph: 6442474; Mktg Mgr: Raman Diwan. Products: Can filling and sealing machines; FFS machines; specialised plants for cheese and other dairy products.

DYNATRON PRIVATE LIMITED, Western Express Highway, Chakala, Andheri (East), Bombay 400099; Ph: 6327152; Mg Dir: J N Kejriwal; Tech Dir: A D Kulkarni. Product: Bottling plants.

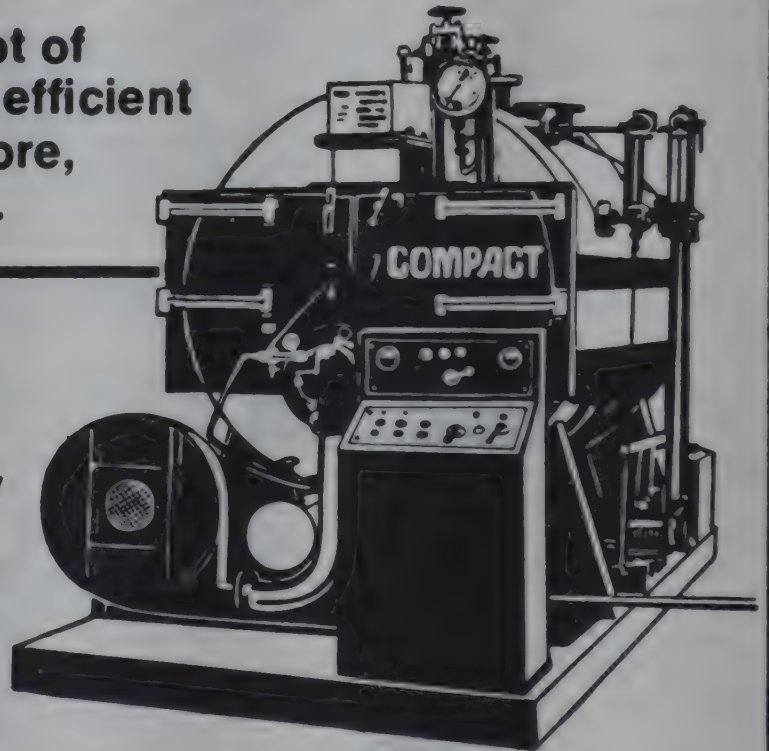
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ELMET INDUSTRIES, W-27 MIDC, Indl Area, Bhosari, Pune 411026; Prop: Gajanan Hegde. Products: Milk storage silos and tanks, road milk tanker barrels, ss equipments. Brand Name: Elemet.

EMMES METAL PVT LTD, 147 Govt Indl Estate, Kandivli (W), Bombay 400067; Ph: 693368/9/0, 695894, Tlx: 011-6487; Mg Dir: B D Pande, Ph: 693029. Product: Dairy plant equipment.

ENERGY MACHINE, C1, B/423, GIDC-IV Phase, Vithal Udyognagar, Vallabh Vidyanagar 388121, Gujarat; Ph: 7443; Partner: Sharad Amin. Products: Automatic thermic fluid heaters, steam boilers, chemical vessels, pressure vessels, dryers and chemical eqpts and machinery.

ESKEYAR ENGINEERING CO PVT LTD, 21 Sir P S Sivaswami Salai, Madras 600004; Ph: 76046, Gram: Designesk, Tlx: 041-7120; Mg Dir: P K N Panicker; Dir: Smt Leela Narendran. Factory: 10/5 Developed Plot, Ambattur Indl Estate, Madras 600058; Ph: 632369; Factory Mgr: N Rajeev Krishnan. Products: Chemical plants and chemical process eqpts.

ESSENJAY MARKETING PVT LTD, A-42 Chandranagri, Salisbury Park, Pune 411001; Ph: 35095; Mg Dir: Shankar Swamy.

ETSCHEID INDIA PVT LTD, 1/8 Prince Golan Md Rd, Calcutta 700026; Ph: 463573; Dir: Ashok Mukherjee. Works: Chakundi, PO Chanditala 712702, Dist Hooghly. Products: Mini milk chilling plants, butterfly valves. Brand Name: Etscheid.

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EXXON PACKING SYSTEMS PVT LTD, Exxon Flats, 9th Floor, Al-Karim Trade Centre, M G Rd, Ranigunj, Secunderabad 500003; Ph: 263209, Gram: Exxon, Tlx: 155-6444; Mg Dir: M Y Maharshi, Ph (resi): 263860. Branches: Bombay (Ph: 263071), Coimbatore, New Delhi (Ph: 5720048), Vijayawada. Factory: D-70, Vth Phase, IDA, Jeedimetla, Hyderabad 500855, Andhra Pradesh. Products: Form fill seal machines. Brand Names: LIQ-PAQ, POW-PAQ, OIL-PAQ.



FILTRON ENGINEERS PVT LTD, Survey No 117-A, Sparc Vithalwadi Rd, Pune 411030; Ph: 444079, 440068, Gram: Nortlif, Tlx: 0145-323 TRON IN; Chmn & Mg Dir: S Hegde; Dir (Engg): L B Jayaraman; Dir (Operations): G V Kirane; Mgr Sales, Food & Dairy Div: K D Shaligram. Products: Can scrubbers, can/crate washers, milk/cream chillers, pasteurizers, ss pipes/fittings, milk/cream/ghee settling, storage tanks, storage silos, CIP equipments, road/rail milk tankers, milk evaporators/spray dryers, plate heat exchangers, cream separators. Milk chilling units and Milk plants upto 300,000 lpd capacity on turn-key basis. Brand Name: Filtron.



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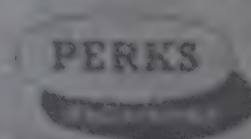
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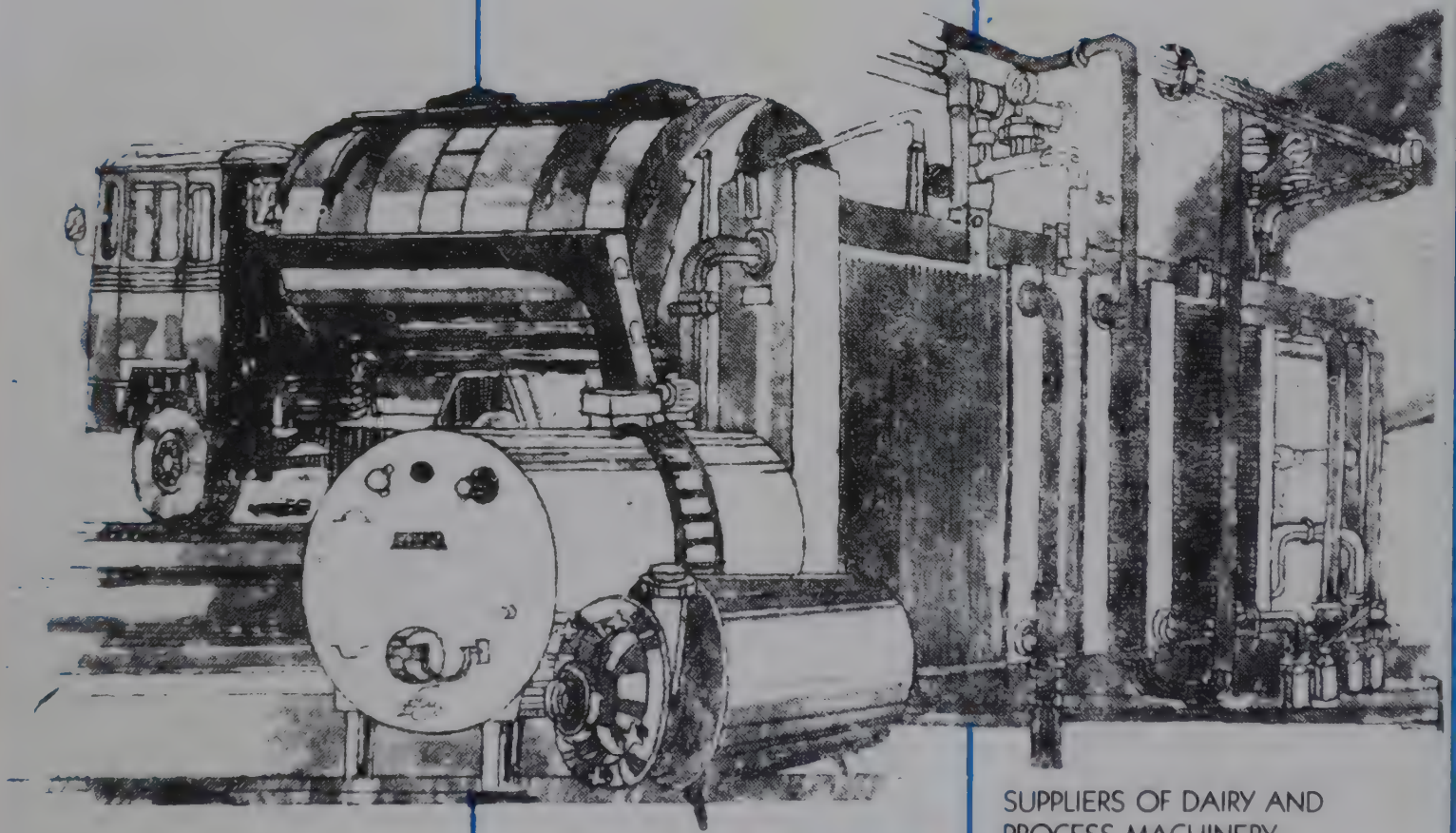


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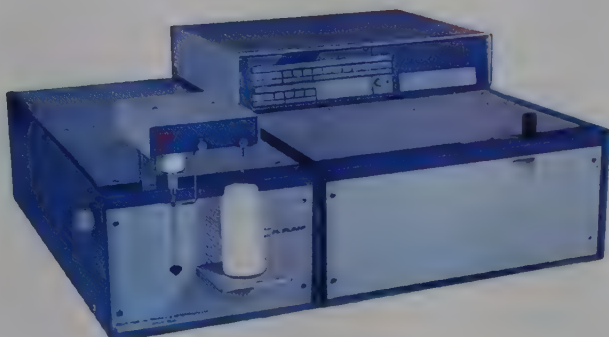


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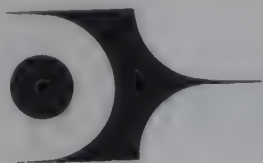
Registered Office & Works

2, Kanakpura Industrial Area,
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Jaipur-302 012, India
Telephone : 61883, 61981

Marketing Division

D-37, Madho Singh Road,
Bani Park, Jaipur-302 006, India
Telephone : 63308, 62738
Telex : 0365-403 Gram : REIL

Ph (resi): 389557. Product: Packaging machinery.



FORM TECHNICS (INDIA) PRIVATE LIMITED,
House No 1601, Sector 34-D, Chandigarh;
Mg Dir: Capt Y P S Parmar. Regd Off & Works: 72 Industrial Area, Baddi, Dist Solan, Himachal Pradesh. Delhi Off: 142 DDA Commercial Complex I, Jhandewalan Extn, New Delhi 110055; Ph: 522056.
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FOSS ELECTRIC INDIA, Thomas Cook Bldg, 324 D N Rd, Bombay 400001; Ph: 2040284, Gram: Bromide, Tlx: 011-3827 IAAC IN; Chief Exec: Sunil Chadha; Chief Engr: Girish Maniar. Products: Milk quality control instruments.

FREEZE KING INDUSTRIES (P) LTD, 7/17 Kirti Nagar, New Delhi 110015; Ph: 530681, 531053, 531054. Products: Compressors and refrigeration equipment.

FRICK INDIA LIMITED, 'Jeevan Vihar', 3 Parliament Street, New Delhi 110001; Ph: 310104, 310249, Gram: Humitemp, Tlx: 3238; Chmn & Mg Dir: Manmohan Singh; Exec Vice-Pres: Sarabjit Singh, Ph: 825691 (5 lines). Branches -- Bombay: Tiecicon House, Dr E Moses Rd; Ph: 4921033, 4924687, 4925203, Gram: Humitemp, Tlx: 2065; Mgr: C P Nagpal; Calcutta: 'Poonam', 5/2 Russel St; Ph: 291179, 296231, Gram: Humitemp, Tlx: 7951; Mgr: Kulbir Singh; Cochin: M G Rd, Ravi Puram; Ph: 353681, Gram: Frick; Mgr: K T Jose; Madras: 185 Mount Rd; Ph: 88923, 88924, Gram: Frick, Tlx: 7181; Mgr: A Ramachandran; Secunderabad: 61-A Suryodaya Complex, M G Rd; Ph: 77897, 821044, Gram: Frick, Tlx: 597; Mgr: Swinder Singh. Product: Refrigeration eqpt. Brand Name: Frick.

FRIGSALES (INDIA) PVT LTD, 204 Commerce House, Nagindas Master Rd, Fort, Bombay 400023; Ph: 272330, Tlx: 011-3414. Regd Off: Grover Mansion, 3/17A Asaf Ali Rd, New Delhi 110002. Products: Air conditioning, refrigeration eqpt.



FRISTAM PUMPS (INDIA) PRIVATE LIMITED, 1184/4 Gokul, Fergusson College Road, Pune 411005; Phone: 51313, 51641, Telex: 0145-323 TRON IN; Managing Director: Sadanand Hegde, Phone (residence): 55735; Director: Gajanan Hegde. Products: Complete range of stainless steel pumps. Brand Name: Fristam.

G R ENGINEERING WORKS PVT LTD, Poonam Chambers, Dr A B Rd, Bombay 400018; Ph: 4928720, Tlx: 011-3807. Bangalore Off: Mahalaxmi Chambers, M G Rd, Bangalore 560001; Ph: 564034, 564071, Tlx: 0845-293. Works: Whitefield Rd, Bangalore 560066. Products: Milk silos, milk tankers, planetary mixers.

GAMI ENGINEERS, 9 Ameer Society, Diwalipura, Baroda 390015; Ph: 65569, Gram: Gami; Mg Partner: Ramesh C Gami. Product: Packaging machines.

GANDHI & ASSOCIATES, A1-436 GIDC, Makarpura, Baroda 390010; Ph: 42716, 42427, Gram: Gandhistil, Tlx: c/o 0175-447 MIEB; Partners: P M Gandhi, Ph (resi): 66512, M B Punater. Product: FRP milk vending units.

GANDHI TRADING CO, 21 Khanderav Market, Opp Taluka Panchayat, Library Rd, Mehsana 384001, Gujarat; Ph: 20574; Partner: Rajeshkumar V Gandhi. Products: Milk testing equipments, cream separators. Brand Name: Gandhi.

GARDNERS CORPORATION, 6 Doctors Lane, New Delhi 110001; Ph: 344287, 343640, Gram: Gardners; Partners: P Narang, S Narang. Branch: C-29 U P Industrial Estate, Meerut Rd, Ghaziabad; Ph: 42177. Products: Cattle feed plants, stainless steel storage tanks. Brand Name: Gardners.

GARWARE BEVERAGES

GARWARE BEVERAGES, Water Treatment Div, 4 Navroji Vakil St, Nana Chowk, Bombay 400007; Ph: 381281, 350765; Chief Execs: Satish Garware, Harish Garware, Ph (resi): 4305571, 4307566. Product: Water purification equipment.

GEETEE ENTERPRISES, 3 Chittaranjan Avenue, Calcutta 700072; Ph: 233974, Gram: Esbeech; Prop: Guha Thakurta, Ph (resi): 461111.

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GEO MILLER & CO (PVT) LTD, Bhandari House, 6th Floor, 91 Nehru Place, New Delhi 110019; Ph: 6432522, 6433023; Mg Dir: S D Mundhra. Products: Effluent treatment plant.

GHANSHYAM ICE BOX MANUFACTURERS (REGD), 11386-A, Ram Nagar Market, New Delhi 110055; Ph: 517357, 516998, factory: 7118706. Products: Ice boxes, push carts, etc.

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GIMRET & CO, 403 Rohit House, Tolstoy Marg, New Delhi 110001; Ph: 3314499, 3314422; Chief Exec: Ranjan Dhingra. Product: Cup filling and sealing machine.



GREAVES COTTON & CO LTD, 1 Dr V B Gandhi Marg, Bombay 400023; Ph: 271524, Gram: Greaves, Tlx: 2517; Mg Dir: G Mathrani, Ph: 271720; Divl Mgr: V B Adhikari. Regl Offices — Bombay: 1 Dr V B Gandhi Marg, -400023; Ph: 271524, Tlx: 2517; Calcutta: Thapar House, 25 Brabourne Rd, -700001; Ph: 264326, Tlx: 5055; Madras: 13 Second Line Beach, -600001; Ph: 510751, Tlx: 503; New Delhi: (a) Express Bldg Annexe, 9-10 Bahadur Shah Zafar Marg, -110002; Ph: 3317660, Tlx: 65808; (b) 22-A Jampath, -110001; Ph: 385061, Tlx: 62663; (c) Himalaya House, 23 Kasturba Gandhi Marg, -110001; Ph: 3310821, Tlx: 66928. Branches — Ahmedabad: Jaladarshan, Ashram Rd, Navarangpura, -380009; Ph: 401856, Tlx: 306; Bangalore: Thapar House, 35 First Cross, Jayachamarajendra Rd, -560027; Ph: 223920, Tlx: 357; Bhopal: 26 Bhadbhada Rd, T T Nagar, -462003; Ph: 67389, Tlx: 217; Bhubaneswar: 122-A Station Square, Unit III, -751001; Ph: 51899, Tlx: 216; Chandigarh: SCO 117-118, Sector 17-B, -160017; Ph: 290287, Tlx: 235; Cochin: XXVII/285-1, M G Rd, Ernakulam, -682015; Ph: 369272, Tlx: 5419; Coimbatore: 1310 Trichy Rd, -641018; Ph: 22302, Tlx: 358; Dhanbad: Rathore Mansion, Bank More, Dhanbad-Jharia Rd, -826001; Ph: 4712, Tlx: 232; Guwahati: G S Rd, Ulubari, -781007; Ph: 31917, Tlx: 272; Goa: 'Damodar', Swatantra Path, Vasco-di-Gama,

-403802; Ph: 3414, Tlx: 294; Hyderabad: 6-2-14 Raj Bhavan Rd, -500004; Ph: 33813, Tlx: 6421; Jaipur: Mirza Ismail Rd, -302001; Ph: 75883, Tlx: 225; Jamshedpur: Gajaraj Mansion, Bistupur 831001; Ph: 27081, Tlx: 238; Lucknow: Plot No 3, 7 Waylane, -226001; Ph: 32526, Tlx: 321; Mangalore: Kumudavathi, 2nd Floor, Bal-matta, -575001; Ph: 26068, Tlx: 225; Nagpur: Rajmahal, Jawaharlal Nehru Marg, Sadar, -440001; Ph: 26588, Tlx: 271; Patna: Exhibition Rd, -800001; Ph: 21644, Tlx: 205; Ranchi: Rani Kuthi, 82 Burdwan Compound, -834001; Ph: 21824, Tlx: 254; Visakhapatnam: Maharani-peta, -530002; Ph: 65354, Tlx: 259. Products: All types of pumps, boilers (coal, gas, oil, steam), gear boxes, pressure joints, Ruston diesel gensets, steam traps, steel valves, temperature regulators, turbine pumps.

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HMT LIMITED, Dairy Machinery Unit, H2 MIDC, Chikalthana IA, PO Box No 20, Aurangabad 431210; Ph: 8594-7, Gram: HMTR, Tlx: 0745-215; Jt Gen Mgr (Incharge, Gen Mgr): H L Khera; Mgr Mktg: S Chatterjee. Directorate: Agril Machinery Div, Pinjore PO 134101, Haryana. Branch Offices — Ahmedabad: Sanskar Bharati Soc, Ankur Rd; Bangalore: 68 St Marks St; Bombay: 9/9A N S Patkar Rd; Calcutta: 31 Chowringhee Rd; Chandigarh: 34 Madhya Marg; Hyderabad: B-1-174 Nizam Sugar Bldg; Lucknow: 1/67 Wazir Hasan Rd; New Delhi: Bharat Yuvak Bhavan, Jai Singh Rd. Products: Milk pasteurisers, cream pasteurisers, milk/cream chillers, milk separators, milk pumps, continuous butter making machine, butter packing machine, turnkey ice cream plants and milk plants, curd separator, etc.

HARDCASE ENGINEERING WORKS PVT LTD, Lalji Meghji Compound, 5-3-325 Mahatma Gandhi Rd, Secunderabad 500003; Ph: 73567, 73446, Gram: Feedplant; Mg Dir: G S Shete; Sales Dir: Rajive Shete; Tech Dir: H R Puntambekar. Factory: P/10/1 IDA, Nacharam 501507; Ph: 852650. Product: Feed plants, chaff cutters, etc.

HEATLY & GRESHAM (INDIA) LTD, 43 Dr V B Gandhi Marg, Fort, Bombay 400001; Ph: 243967. Product: Dairy plant eqpt.

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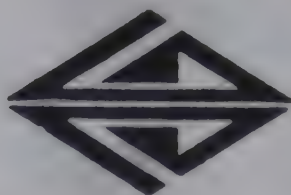
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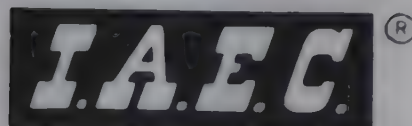
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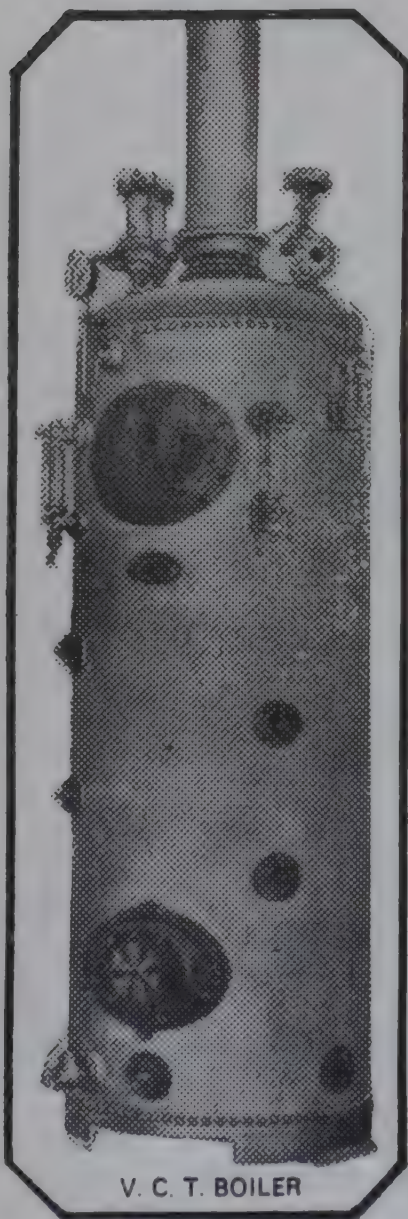
- HEMKUNT INDUSTRIAL CORPORATION**, 5/217 Subhash Nagar, New Delhi 110027; Ph: 5417935; Partners: Smt Gursharan K Rana, Smt Balvinder Kaur, Ph: 594092. Factory: GI-102 Mayapuri Industrial Area, Phase II, New Delhi 110027. Products: Complete range of dairy eqpt.
- HI-SPEED TURBODRIVES**, 444 GIDC, Vithal Udyognagar, Vallabh Vidyanagar 388121, Gujarat; Ph: 7636, Gram: Turbodrives; Mg Partner: Sharad Amin, Ph (resi): 7553; Mgr: Shrikant Shah. Products: Industrial fans and blowers, fume extraction system, pneumatic conveying system.
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- HINDUSTAN LIVESTOCK SALES CORPORATION**, 80 Hardwar Rd, PO IIP, Mokhampur, Dehradun 248005, UP; Ph: 25853, Gram: Atma, Tlx: 0595-270; Pres: Dr A S Bindra. Branches: Bihar, Delhi, Haryana, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu. Foreign Principals (Products): L'Air Liquide, France, & SMC-TBT, France & Sulzer, UK (Liquid Nitrogen Plants); Simon Food Engineers, UK (Multi Products Plants).
- HINDUSTAN PACKAGING COMPANY LIMITED**, Paper Laminating Plant, Near Itola Railway Station, Vadodara 391240, Gujarat; Ph: 22 (POR), Gram: Hindpac, Vadodara, Tlx: 0175-267 HDPC IN, 0175-239 IDC IN (PP); Chmn, Mgmt Cttee: Dr R P Aneja, Ph off: 66432; Factory Mgr: S L Taneja. Regd Off: NDDB Campus, Anand 388001; Ph: 3002 to 3011, Tlx: 0172-207 NDDB IN. Products and Services: Leasing of aseptic packaging machines including service and maintenance.
- HYDRAULIC & GENERAL ENGINEERS LTD**, 203 Arun Chambers, J Dadajee Rd, Bombay 400034; Ph: 4948075, 4948393. Products: Effluent treatment plant.



- I A E C (INDIA) LIMITED**, 196 L B Shastri Marg, Bhandup, Bombay 400078; Ph: 5616188-92, Gram: Agrícola, Tlx: 011-71947; Mg Dir: T S Champaknath; Exec Dir: B K Das. City Off: 43 Dr V B Gandhi Marg, Fort, Bombay 400023; Ph: 244019, 244033, 244120, Gram: Agrícola, Tlx: 011-2938. Works: D-93 MIDC Area, Ahmednagar 414111; Ph: 65, 66, Tlx: 0743-218. Branches -- Baroda: Vidyanand, 78-A Urmi Society, Productivity Rd, -390005; Ph: 65209, Tlx: 175-535; New Delhi: K Block, Chaudhury Bldg, Connaught Circus, -110001; Ph: 350423, 350373, 350473, Gram: Switchgear, Tlx: 031-2633; Mgr: R P Jhurani. Associate Offices -- Bangalore: I A E C (Mysore) Pvt Ltd, 3/4 Okalipuram, -560021; Ph: 350211, 350212, Gram: Agrícola, Tlx: 0845-209; Vice-Pres: N K Ramdas; Calcutta: I A E C (Calcutta) Pvt Ltd, 5 Mission Row, (19 R Mukherjee Rd), -700021; Ph: 238881, 238075, Gram: Contoursaw, Tlx: 021-7617; Hyderabad: I A E C (Hyderabad) Pvt Ltd, "Dayalu", 1-2-605/1 Lower Tankbund Rd, Secunderabad 500380; Ph: 60135-37, Gram: Pumps, Tlx: 0155-311; Mgr: K S Murali; Indore: I A E C (Indore) Pvt Ltd, 74 Vallabh Nagar, -452003; Ph: 4887; Kanpur: I A E C (Kanpur) Pvt Ltd, 117/14 Sarvodaya Nagar, -208005; Ph: 219692; Madras: I A E C (Madras) Pvt Ltd, 67 Luz Church Rd Mylapore, -600004; Ph: 75685, Gram: Agrícola, Tlx: 041-7185, Mgr: U M Vaidyanathan. Products: Oil, gas and coal fired boilers, fluidized bed combustion boilers, oil/gas burners, safety, blowdown and piston valves, level indicators, butterfly valves, etc.
- IBP CO LIMITED** (A Govt of India Enterprise), Engineering Div, Sewri (East), Bombay 400015; Ph: 4129714/15, 4129741/42, Gram: Indotech, Tlx: 11-71188 IBPB IN; Chmn & Mg Dir: M S Khanna; Gen Mgr: R T Chikhli; Sales Mgr: S G Nevatia. Regd Off: Gillander House, Netaji Subhas Rd, Calcutta 700001; Ph: 224821, Tlx: 021-7402, 7296. Branches -- Calcutta: Gillander House, Netaji Subhas Rd, -700001; New Delhi: 55 Deepak, 13 Nehru Place, -110019. Products: Cryogenic containers and freeze drying plants.

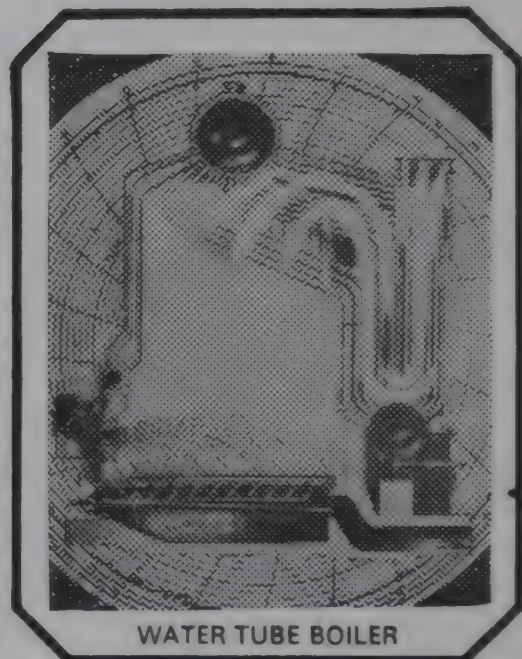
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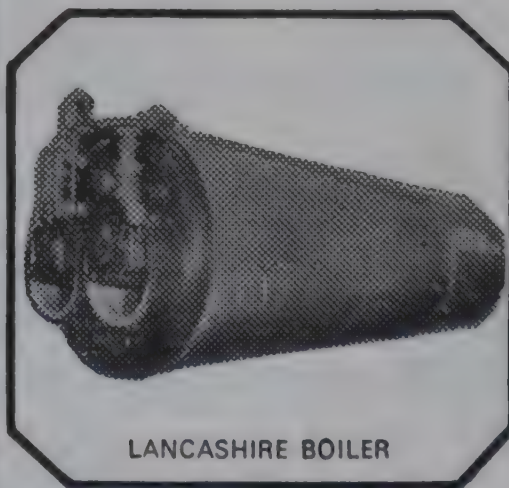


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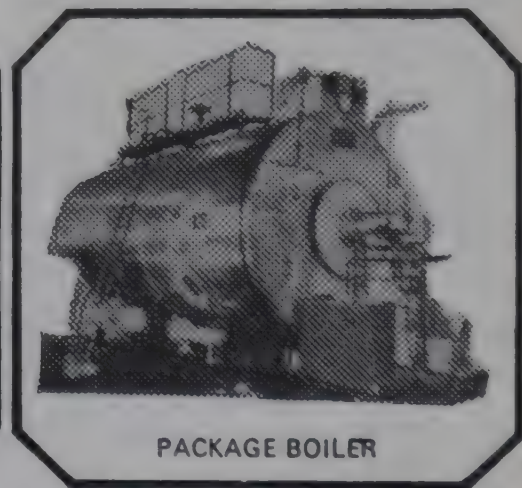
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INDIAN DAIRY MACHINERY COMPANY (A unit of Indian Dairy Corporation, Managed by National Dairy Development Board), C-1/11-12 GIDC, Vithal Udyognagar 388121, Gujarat; Ph: 7490, 7831, 7974, Gram: Indmac, V V Nagar, Tlx: 0172-206 IDMC IN; Proj Mgr: Mahesh Chandra; Asst Mgr (Fabrication): K Mathiyalagan; Asst Mgr (Erection): Anil Sheno. Products/Services: AI Consumables, CIP units, stainless steel tanks, tankers, milk flow meters, pasteurisers, chillers, liquid nitrogen pumps, valves and fittings. Undertake erection of dairy plants, aseptic packaging stations, chilling centres and oil mills on turnkey basis.

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INDRA FABRICATORS, 44 Yusuf Bldg, 4th Floor, Veer Nariman Rd, Fort, Bombay 400023; Ph: 2042001, 2049669, Gram: Coptboiler, Tlx: 11-3370 COPT IN; Prop: B S Grover; Mgr (Tech): Ashok Grover; Mgr (Comm): Vinod Grover; Factory Incharge: P Murlidharan. Works: 27(A) Block No C, Ghatkopar Indl Estate, LBS Marg, Bombay 400086. Products: Boilers IBR and Non-IBR, pressure vessels, coded fabrication. Brand Name: Compact.



INDUSTRIAL AIDERS, 219 Peera Garhi, Rohtak Rd, Delhi 110041; Ph: 87521, Gram: Indussaid, New Delhi; Partners: L B S Bir, Ph (resi): 537904 & G B S Bir,

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INDUSTRIAL GASES LIMITED, THE, 15 Ganesh Chandra Avenue, Calcutta 700013; Ph: 262920, Gram: Indusgases, Tlx: 021-5068; Mg Dir: D K Garg, Ph: 265137; Dep Mg Dir: T Garg, Ph: 267988; Exec Dir: S K Sangal. Products: Cryogenic eqpt.

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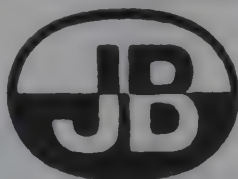
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- 560058; Ph: 385791, Gram: Ingersiler, Tlx: 0845-620. Products: Air and gas compressors and vacuum pumps.
- J N MARSHALL PVT LTD, Bombay-Poona Rd, Kasarwadi, PB No 37, Poona 411034; Ph: 83495, Gram: Elektron, Tlx: 0145-265 JNMP. Products: Pipes, pipe fittings, pressure gauges, steam traps, valves.
- J S ENGINEERING WORKS, C-68 Mayapuri Industrial Area, Phase II, Rewari Line, New Delhi 110064; Ph: 592575, 593587, 584550, Gram: Jayflow; Partner: Jasbir Singh. Product: Homogenizers. Brand Name: Jewel.
- JAY COACH ENTERPRISES PVT LTD, 84-A Western Express Highway, Goregaon (East), Bombay 400063; Ph: 685844. Product: Milk tankers.



- JAYA & COMPANY, 30 PNR Naidu Layout, Trichy Rd, PB No 3740, Coimbatore 641018; Ph: 23994, 26416, Gram: Boiler, Tlx: 855-381 JAYA IN; Mg Partner: J S Kamath, Ph (resi): 35498; Partner: R Suresh. Product: Steam boilers. Brand Name: Jaya.
- JAYEMS PARKIM PRIVATE LIMITED, 130/132 Apollo St, Great Western Bldg, Bombay 400023; Ph: 245118-47-67-73, Gram: Jayems, Tlx: 011-6519 JAYM IN; Dir: K G Narumalani. Factory: Plot No A-117, Rd No 22, Wagle Industrial Estate, Thana 400604; Ph: 595470, Gram: Parkim; H M Doshi. Branches: Ahmedabad, Bangalore, Bhopal, Calcutta, Coimbatore, Ernakulam, Kanpur, Ludhiana, Madras, New Delhi, Rajkot, Secunderabad. Products: Agitators, bins, bucket elevators, classifiers, conveyers, feeders, feed plants, fluid bed dryers, heat exchangers, mixers, pellet coolers, pellet mills, pollution control systems, filters, spray dryers, valves. Brand Name: Jayems.
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- JUPITOR GLASS WORKS, B-209 Nariana Indl Area, Phase I, New Delhi 110028; Ph: 533100, 535773, Gram: Butymeters; Prop: Y P Nangia, Ph (resi): 593574. Product: Butyrometers, pipettes. Brand Name: Benny-R.
- JINENDRA AGENCIES, 5 Shiv Sadan, Sardar Patel Marg, Indore 452001; Ph: 4776;

- Prop: Anil Bhoje. Products: Butter churners, chilling plants, cream separators, fat machines, etc.
- JYOTI LTD, Industrial Area, PO Chemical Industries, Vadodara 390003, Gujarat; Ph: 82851, Gram: Jyotipumps, Tlx: 0175-214; Mg Dir: N B Amin; Divl Mgr (Agri Products): K M Patel. Energy Division: Tandalja, Vadodara 391410; Ph: 59518, 59618, Gram: Jyotipumps, Tlx: 0175-214; Product Sales Mgr: M S Rama Prasad. Branches: Bangalore, Bhopal, Bombay, Calcutta, Chittorgarh, Guwahati, Indore, Jaipur, Jamshedpur, Lucknow, Madras, New Delhi, Patna, Pune, Secunderabad, Vadodara. Products--Agril Eqpt Div: Milking machine; Energy Div: Solar cold storages, solar desalination systems, solar hot air systems, solar water systems. Brand Name: Jyoti.
- K V ELECTRICAL ENGINEERING CO, 901 Sidhi Towers, Saibaba Nagar, Borivili (West), Bombay 400092; Prop: C A Kapadia. Factory: C/10 Swastik Indl Estate, Goddev Rd, Bhayandar (E), Thane 401105. Product: Control panels.
- KARTHIC ENTERPRISES, 24-F Street, Cleveland Town, Coles Rd Cross, Bangalore 560005; Ph: 561430; Prop: V K Ethiraj. Products: Bottle fillers, washers and caps, milk coolers.
- KESSEL ENGINEERING CO, G-9 Everest, J Dadajee Marg, Bombay 400034; Ph: 4944537. Product: Boilers.



- KHAMBETE KOTHARI CANS & ALLIED PRODUCTS PVT LTD, B-5 Industrial Area, Ajintha Rd, PB No 89, Jalgaon 425001; Ph: 4750, 5384, Gram: Milk cans, Tlx: 0753-226 CANS IN; Chmn & Mg Dir: Rajnikant Kothari, Ph (resi): 5351. Branch: 21 Keshavji Naik Rd, Bombay 400009; Ph: 861628, 862379, Gram: Oildealer; Dir: R C Chheda; Gen Mgr: P R Sutaria. Products: Aluminium one piece milk cans in 50, 40, 30, 20 litres capacity.
- KIRLOSKAR ELECTRIC CO LTD, Rajaji Nagar, Industrial Suburb, PB No 5555, Bangalore 560010; Ph: 35311, Gram: Raviudaya; Mg Dir: R Davi L Kirloskar; Gen Mgr: B G Bhakey. Product: Generators.
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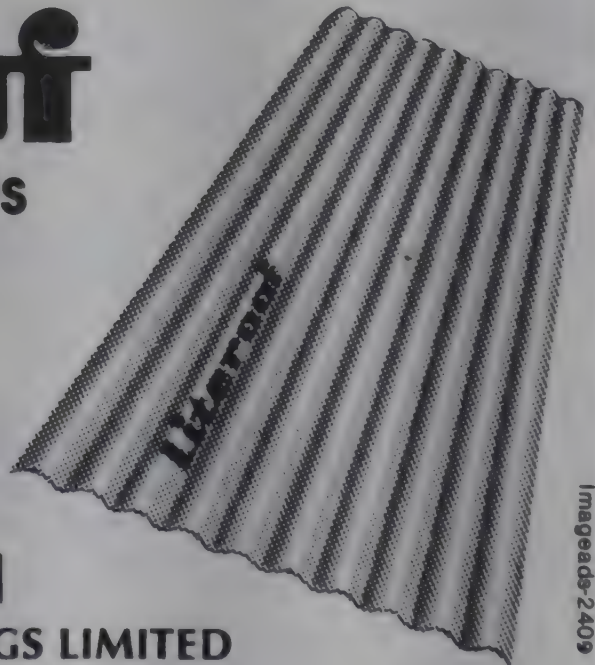
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Bangalore: Archbishop Bldg, 5 Residency
 Rd, -560025; Ph: 570203, Gram: Hima-
 gauri, Tlx: 8343; Area Mgr: A R Kulkarni;
Bombay: 602-603 Dalamal House, Jamnalal
 Bajaj Rd, Nariman Point, -400021; Ph:
 220424, Gram: Flakice, Tlx: 3454; Regl
 Mgr: S K Verma; Calcutta: 15 Ganesh
 Chandra Avenue, -700013; Ph: 269080,
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 16 Vidhan Sabha Marg, -226001; Ph: 44367,
 Gram: Himagauri, Tlx: 213; Area Mgr: N S
 Sharma; Madras: Spencer's Bldg, 768
 Mount Rd, -600002; Ph: 89063, Gram: San-
 jay, Tlx: 7831; Regl Mgr: S Sundara
 Raman; New Delhi: 208 Meghdoot, 94 Nehru
 Place, -110019; Ph: 6432584, Gram: Flak-
 ice, Tlx: 61053; Regl Mgr: Dev P Chadha;
Visakhapatnam: Mizar House, 10-129 T B
 Rd, -530003; Ph: 65183, Gram: Flakice;
 Area Mgr: R P Mohapatra. Products: Air
 conditioning and refrigeration compres-
 sors, flake and auto ice plants, water
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 ing units, condensers and coolers.

KISHORE TRADING CORPORATION, PB No 9202,
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 Bombay 400086; Gram: Dairyfoils, Bombay
 400015; Prop: Kishor M Doshi, Ph (resi):
 5135894. Sales Off & Works: 203 Bussa
 Udyog Bhavan, Tokershi Jivraj Rd, Sewri,
 Bombay 400015; Ph: 4131617. Products:
 Milk testing equipments, Aluminium foil
 caps and foil rolls, Cream seperators
 and Chemicals. Brand Name: KTC.

KOLSITE INDUSTRIES, 31 Shah Industrial
 Estate, Off Veera Desai Rd, Andheri (W),
 PB No 7368, Bombay 400058; Ph: 571461,
 Gram: Kolsite, Tlx: 011-71160; Partners:
 S V Kabra, S N Kabra. Branches: Ahmedabad,

Calcutta, Delhi and Madras. Products:
 Co-extruded polyethene film plants.



KPSAR ENGINEERING WORKS, J-10/46 Rajouri
 Garden, New Delhi 110027; Ph: 594092;
 Mg Partner: Harnam Singh; Partner: K P
 Singh; Mgr: Ravinder K Arora. Works:
 (i) 5/217 Subhash Nagar, New Delhi
 110027; Ph: 5417935; (ii) GI-102 Maya-
 puri Industrial Area, Phase II, New
 Delhi 110027. Products: Dairy equipment,
 stainless steel fittings, pumps and
 filters. Brand Name: Kpsar.

KRAUN METTALEX, Purshottam Estate, Bahu-
 charaji Rd, Baroda 390018. Product:
 Conveyors.

KRISTAM ENGINEERS PVT LTD, 3/13B Asaf Ali
 Rd, New Delhi 110002; Ph: 273294; Dirs:
 M B Lal, Ph (resi): 6442108, 6443347,
 S K Jerath, Ph (resi): 205281, N R Saini.
Factory: Dehradun Rd, PO Kailashpur,
 Saharanpur 247001; Ph: 6452, Gram: Kris-
 tam; Dir: M M Sobti. Products: Boiler
 systems, butter making equipment, chil-
 lers, dairy plant equipment, feed plants,
 ghee making plants, milk powder plants,
 refrigeration, tankers, pasteurizers,
 storage tankers, pipe fittings & deara-
 tion plants.

KUMAR INDUSTRIES, Kandaghat 173215, Himachal
 Pradesh; Ph: 41; Prop: V K Sharma. Rep
Add: D-37 Tandon Rd, Adarsh Nagar, Delhi
 110033; Mgr: Vinod K Sharma. Product:
 Thermometers. Brand Name: V-Brand.



LAKSHMI MILKTESTING MACHINERY CO, A-90 Wazir-
 pur Group Industrial Area, Delhi 110052;
 Ph: 7125171; Mg Partner: M P S Chadha,
 Ph (resi): 7119050; Partners: M S Chadha,
 B S Chadha, Ph (resi): 7215121; Contact Off:
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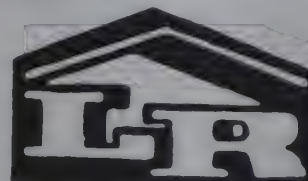
LARSEN & TOUBRO LIMITED

LARSEN & TOUBRO LIMITED, L&T House, Ballard Estate, Narottam Morarjee Marg, PB No 278, Bombay 400038; Ph: 268181, Gram: Larsenbro, Tlx: 011-73346, 011-75028, 011-75011; Chmn & Pres: N M Desai; Vice-Pres (Ops): D L Pradhan; Group Gen Mgr: A M Naik; Dep Gen Mgr, Food Processing Div: S D Pandit. Works: Ahmednagar, Awarpur, Bangalore, Powai and Madh (Bombay), Faridabad, Hazira, Hebbal, Kansbahal. Regl Offices — Calcutta: 3B Shakespeare Sarani, PB No 619, -700071; Ph: 442301, Gram: Larsenbro, Tlx: 021-7331; Madras: 9-10 Club House Rd, Mount Rd, PB No 5247, -600002; Ph: 82141/8, Gram: Larsenbro, Tlx: 041-270; New Delhi: 32 Shivaji Marg, PB No 6223, -110015; Ph: 531302, Gram: Larsenbro, Tlx: 031-2207. Branch Offices: Bangalore, Baroda, Bhopal, Bombay, Chandigarh, Cochin, Durgapur, Hyderabad, Jaipur, Lucknow, Rourkela. Resident Representatives: Ahmedabad, Bhilai, Bhubaneswar, Bokaro, Coimbatore, Dehradun, Dhanbad, Guwahati, Jammu, Jamshedpur, Kota, Madurai, Nagpur, Panaji, Patna, Ranchi, Udaipur, Varanasi, Visakhapatnam. Foreign Principals: Atlas, Brodrene Gram, Bemac, Buss, Cerekem, Diessel, Goudsche, Lindhorst, NE Wernberg, Niro, Pasilac-Danish Turnkey, Rannie, Seitz, Sig, Soya Technology Systems, U D Engg Co, Vettori Menghi. Products: Turnkey installation of complete dairy plants for processing milk and milk products. Plant and equipment for abattoirs, soy-milk processing, meat processing, accelerated freeze drying, evaporators and suspended particles drying plants for milk and allied products, tea, coffee, protein isolates and other food products, butter moulding and wrapping machines, separators and clarifiers, bottling plants, thin film evaporators, chocolate machinery, aseptic and non-aseptic packaging machinery.

LATA IRON & STEEL WORKS, Head Off: F-12 Kailash Colony, New Delhi 110048; Ph: 6447446; Mg Partners: Ramesh Trehan, S M Lata. Regd Off & Works: E-177, M I Area, Alwar, Rajasthan; Ph: 196 (MIA Ex). City Off: 62 Friends Colony, Alwar;

Ph: 20292, 20286. Products: Dairy, pharmaceutical, chemical plants and equipments including heat exchangers, coded vessels, road milk tankers, evaporating units, evaporating plants and spray drier plants, jacketed vessels. Brand Name: Lata.

LAXMI SCIENTIFIC INDUSTRIES, 25 Vikram Estate, Opp Sagar Society, Mehsana 384002; Mg Partner: M D Chaudhari. Product: Milk testing equt. Brand Name: Laxmi.



LIGHT ROOFINGS LTD (in collaboration with Techados, Monerry, Mexico), 218 Lloyds Rd, Gopalapuram, PB 1474, Madras 600086; Ph: 470736, 470757, Gram: Literoof, Tlx: 041-6567 LR IN; Mg Dir: M M Rafi; Exec Dir: K Santhanakrishnan; Regl Mgr (South): M A Rizvi. Regl Offices — New Delhi: 1076 Hardhian Singh Rd, Karol Bagh, -110005; Ph: 5725011, Tlx: 031-62458 LRD IN; Regl Mgr (North): V Sivraj, Ph (resi): 5714418; Bombay: Block A/2 Dwarkapuri, L B Shastri Marg, Kurla North, -400070; Ph: 5130060, 51331165; Regl Mgr: S Guhan; Calcutta: 9/2-B, Talbagan Lane, Orient Row, Park Circus, -700017; Ph: 449064, Tlx: 021-4125; Regl Mgr: S Mohan. Product: Roofings. Brand Name: Literoof.

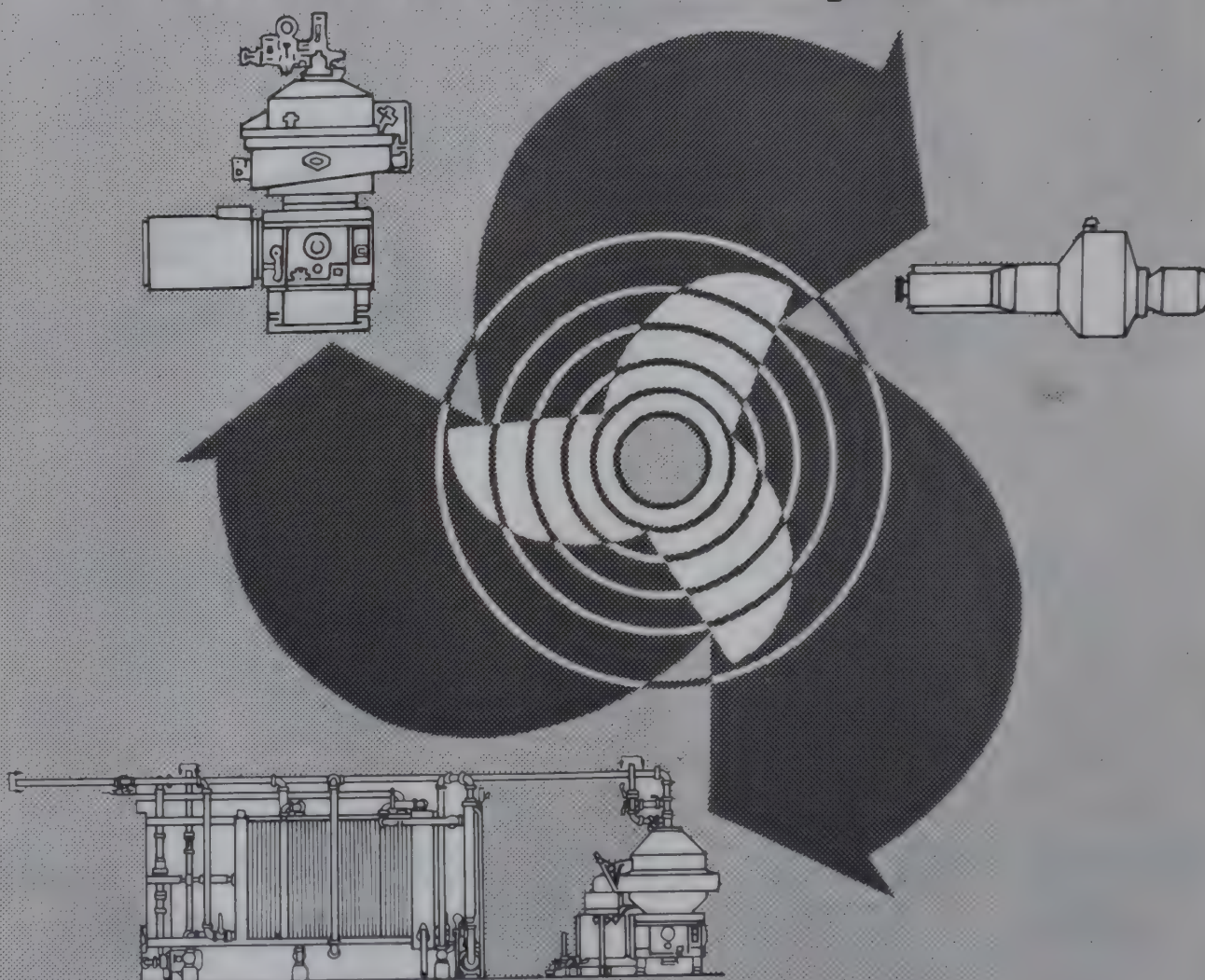
LIPI BOILERS PVT LTD, Mahendra Chambers, May Fair-A, 4 Dhole Patil Rd, Pune 411001. Product: Boilers.

LLOYDS STEEL INDUSTRIES PVT LTD, Engineering Div, Lloyds House, 86/19 M Vasanji Rd, Marol, Andheri (E), Bombay 400059; Ph: 6340301/02/03, Gram: Lloydsteel, Tlx: 011-6236; Mg Dir: R N Gupta; Exec Dir: Mukesh Gupta; Sales Mgr: N V Bhat. Regd Off: 502 Raheja Centre, Nariman Pt, Bombay 400021. Regl Offices: Calcutta, Madras, New Delhi. Products: Dump tanks, insulated storage tanks, silos, road/rail milk tankers.

LOWTEMP EQUIPMENT CO, WZ-25 Basai Darapur, Najafgarh Rd, New Delhi 110015. Products: Ice cream cabinets, etc.

LUCKY STEEL INDUSTRIES, Juna Rasta, Near Gamdi Vad, Anand 388001; Ph: 92; Mg Partner: Dinesh Panchal, Ph (resi): 1391. Products: Boiler pumps, bottle conveyor chains, butter/cheese packing machines, can washer, embossing machines, valves.

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- M C DALAL & CO**, No 12 Pillayar Koil St, PB No 2346, Madras 600003; Ph: 33554, 39881, Gram: Acetone; Partners: Pravinchandra V Shah, Kirti Kumar V Shah, Suresh Kumar V Shah, Kiran Kumar V Shah, Ph (resi): 38402. Products: Laboratory instruments and glassware. Brand Name: Dalal.
- M H ENGINEERING WORKS**, Gotteshah, New Colony, 11/280 B20, Saharapur 247001, UP; Prop: Matlub Hassan. Product: Dairy eqpt.
- M K ENTERPRISE**, 521 Sreemanta Market, A T Rd, Guwahati 781001; Ph: 27031, 27747, Gram: Redrose; Chief Execs: K C Jain, R K Jain; Exec: D K Das. Branches — Arunachal Pradesh: Naharlagun, Itanagar; Manipur: Nagamaphal, Imphal; Meghalaya: Bawri Mansion, Dhankethi, Shillong; Nagaland: Jain Temple Rd, Dimapur. Products: Frozen Semen/Laboratory/Dairy equipments including liquid nitrogen plants and containers, servo stabilisers, AI straws, sterilizers, cold handling box, milk chilling plants, generators, water bath, hot air ovens, etc. Distributors of: IBP Co Ltd, Bombay; Hindustan Livestock Sales Corporation, Dehra Dun; Innovative Instruments, Baroda; Logic Controls Pvt Ltd, New Delhi; Modern Industrial Corporation, Bombay.
- M M TRADERS**, 30/3 Double Storey, Ashok Nagar, PO Tilak Nagar, New Delhi 110018; Ph: 5413949; Proprietor: M M Malik. Products: All types of dairy equipment.
- M SANT SINGH & SONS (REGD)**, 3794 Mori Gate, Delhi 110006; Ph: 2910721, 2515680; Mg Partner: Avtar Singh; Partners: Harbans Singh, Paramjeet Singh. Products: Ghee settling tank, pasteruriser, storage tank, vacuum filling machine, crown corking machine, chain and conveyor, valves and pipe fittings, nuts and bolts.
- MACBRO ENGINEERING CO**, Ashirwad, 31/1 South Tukoganj, Indore 452001; Ph: 4621, 21131, Gram: Adcon, Tlx: 0735-224 AEPL IN; Mg Partner: B G Kher. Products: Control panels and turnkey engineering projects.
- MALHATI TEA & INDUSTRIES LTD**, Engineering Div, 11 Government Place East, Calcutta 700069; Ph: 238231; Sr Exec: Mihir K Goswami. Branches: Bombay, Cochin, Coimbatore, New Delhi. Products: Package processing and packaging machine, shrink wrap machines.
- MALHOTRA SCIENTIFIC GLASS WORKS**, Hargolal Rd, Ambala Cantt 133001; Ph: 21081; Prop: B L Malhotra. Products: Milk testing

eqpt, butyrometer, milk pipette. Brand Name: Milco.

MANN DAIRY & FOOD SERVICES, F-220 Vikaspuri, New Delhi 110018; Ph: 5432878; Prop: S S Mann. Products: Turnkey projects for milk and cereal products, chilling centres, road tankers, storage tanks, silos, vats, ghee kettle.

MATHER AND PLATT (INDIA) LTD, Process Machinery Div, Hamilton House, 8, J N Heredia Marg, Ballard Estate, PB No 327, Bombay 400038; Ph: 269651, 264002, Gram: Mather, Tlx: 011-73520; Divl Mgr: J K Goyanka. Products: Complete filling line including conveyors for condensed milk and ghee.

MAZDA INTERNATIONAL PVT LTD, No 79 (1) World Trade Centre, 1st Floor, Cuffe Parade, Colaba, Bombay 400005; Ph: 212329, 213624, Gram: Mazmill, Tlx: 011-5307; Exec Dir: Arun N Trivedi, Ph (resi): 368897. Branches — Cochin: 10-10-A Mini Stadium, Maharajas College Ground, -682001; Madras: 14/15 Old Trunk Rd, Pallavaram, -600043. Products: Conveyor systems, weighing machines. Brand Name: Mazda.

MECWEILL INDUSTRIES, Undishery, PB No 11, Anand 388001; Ph: 1772; Prop: K S Pandya.

METAL BOX INDIA LIMITED, Barlow House, 59C Chowringhee Rd, Calcutta 700020; Ph: 442351, Gram: Embecolim, Tlx: 7276; Mg Dir: K Puri; Mktg Mgr: Deepak Manchanda. Divisions: Metal Packages, Paper & Plastics, Research. Regl Offices — Bombay: 249 Worli Rd, Worli, -400025; Ph: 4930871, Tlx: 71210; Calcutta: P-48 Hide Rd Extn, -700088; Ph: 455631, Tlx: 2294; Madras: 114 Elaiya Mudali St, Tondiarpet, -600081; Ph: 553371, Tlx: 292; New Delhi: Allaha-bad Bank Bldg, 17 Parliament St, -110001; Ph: 312591, 312793, 312692, Tlx: 63356.

Products: CLOSURES: Crown corks, pre-screwed caps, R S Pilferproof, etc; CONTAINERS: Open top and general line, aluminium monoblock aerosol, collapsible and rigid tubes; ENGINEERING PRODUCTS: Special purpose package fabrication and closing eqpt and machinery, components, printing machinery; turnkey projects; PAPER & PLASTIC PRODUCTS: Treated, lithographed and laminated paper and board cartons, labels, wraps, hermetet lined cartons, heat-sealing films and laminates pouches from laminates; PRINTING SERVICES.

METAL INDIA, Metal House, 182 Kalbadevi Rd, Bombay 400002; Ph: 293819, Gram: Weldwin, Tlx: 011-3687; Mg Partner: P G Purohit. Products: SS pipes, plates, rods, sheets, tubes.

METTERS INTERNATIONAL, Anjali, 2nd Floor, 29 St John's Church Rd, Bangalore 560005; Ph: 575064, 578688, 568384, Gram: Silverend, Tlx: 0845-8037; Gen Mgr: Mohan Mascarenhas, Ph (resi): 571149. Products: Cryogenic containers, AI eqpt, Frozen semen & laboratory eqpt.

MICRO MECHANICAL WORKS, B Kumar Compound, L B S Marg, Vikhroli, Bombay 400083; Ph: 581966, 583931, Gram: Micro, Tlx: 011-71450; Chief Exec: Surinder S Bhurjee. Product: Corrugated board and box manufacturing machines.

MILKO INDUSTRIES, 12 Mangesh Senoy Rd, Fort, Bombay 400001; Ph: 260529, 261765; Partner: H J Dharamsey. Factory: 35-B Parwati Indl Estate, Pune-Satara Rd, Pune 411037; Ph: 446755; Partner: A V Bam. Product: Pasteuriser, chilling unit, tank, etc. Brand Name: Milko.

MODERN INDUSTRIAL CORPORATION, 123 Ardeshir Dady St, Kapadia Bldg, PB No 3724, Bombay 400004; Ph: 367920, Gram: Modtrial; Prop: A C Bothra. Products: SS pipe/pipe fittings, sheets, plates, rods, wires. Brand Name: Modern.

MODERN ROOFINGS LIMITED, Tadimalla 534305, via Nidadavole (RS), AP; Ph: 31 (Tadimalla), Gram: Roofsheets; Mg Dir: K Rama Rao; Exec Dir: B Lakshmiathy; Dir (Mktg): K Ravi Kumar. Branches: Bangalore, Bombay, Calcutta, Hyderabad, Madras, New Delhi, Vijayawada. Product: Asphaltic roofing sheets. Brand Name: Modernroof.

MODERN SCIENTIFIC INSTRUMENT CO, 48-A Sada-Shiv Cross Lane, Bombay 400004; Ph: 354108; Partner: M M Shah. Product: Industrial eqpt. Brand Name: MIC.

MODESTO PACKAGINGS PVT LTD, Gulmarg Hotel, Shimla 171003; Ph: 3168, 3169, 5454; Mg Dir: Bhupinder Goel; Dir: Anil Aggarwal. Factory: Plot No 14, Sector 5, Parwanoo, Solan Dist. Product: Packaging equipment.

MOHAN MACHINES LIMITED, F-79/80 Okhla Indl Area Phase I, New Delhi 110020; Ph: 633426, 636285, 636296, Gram: Mohanfab, Tlx: 031-65855 MML IN; Gen Mgr: Har-kishan Singh; Dep Mgr: G Prasad. Regd Off: Mohan Singh Bldg, Connaught Lane, New Delhi 110001; Ph: 3316881; Chmn: Charanjit Singh; Mg Dir: Ajit Singh; Dir: Daljit Singh. Products: Automatic bottling plants, road and rail tankers, chemical eqpts, refrigeration plants and cold storages, etc.

MONEX INDIA CORPORATION, 3 National Chambers, Ashram Rd, Ahmedabad 380009; Ph: 409935, Gram: Honey; Mg Partner: M A Thakkar, Ph (resi): 443660. Product: Road and rail tankers, refrigeration plants, milk storage tank and silos, bottling plant, boilers, ss pipes & fittings. Brand Name: MM and compact.



MULAKH RAJ & CO, 204 Azad Market, Delhi 110006; Ph: 512957, 512609, Gram: Milk-test; Mg Partner: Jagdish C Arora, Ph (resi): 500986; Partner: Suresh Arora. Products: Cream separators, milk cans, milk testing equipment including butyrometers, lactometers, pipettes, amyl-alcohol. Brand Name: Asha.

MULTIFRIG MARKETING COMPANY (PVT) LTD, 1/12 Kirti Nagar (WHS), New Timber Market, New Delhi 110015; Ph: 535376, 5416277, Gram: Hamlay; Mg Dir: K L Wahi, Ph (resi): 665306; Dirs: C B Wahi, Ramesh Anand. Branch: Mehta Enterprises, A-12 Jayanti Market, M I Rd, Jaipur; Ph: 61141; Prop: Paras Mehta. Product: Refrigerated cabinets. Brand Name: Chandra.

MUM ENGINEERING COMPANY, 12/6 Mile Stone, Gurukul, Near Railway Crossing, PO Amar Nagar, Faridabad 121003; Ph: 82-5441; Partner: Swapan Chatterjee; Tech Advisor: R P Banerjee, Ph (resi): 637446. Products: Centrifugal pumps, ejectors, pipe fittings, thermo compressor, valves. Brand Name: MEC.

NARMADA VALLEY FRICTION MATERIALS PVT LTD, 336/3 GIDC, Makarpura, Vadodara 390010; Ph: 42974, Gram: Navkadisc.

NARNE TULAMAN MANUFACTURERS PVT LTD, Balanagar, Township, Hyderabad 500037; Ph: 261561-2, Tlx: 0155-531. Products: Weighing machines, weighbridges.

NATIONAL GLASS BOTTLES CO, 89 Nagindas Master Rd, Ararat Bldg, Fort, Bombay 400001; Ph: 271882, 271733; Partner: M L Gupta. Product: Bottles.

NATIONAL HEAVY ENGINEERING COOP LTD, 3 Siri Institutional Area, 5th Floor, Hauz Khas, New Delhi 110016; Ph: 654851. Products: Chilling and refrigeration plants.

NATIONAL MEDITEK, D4/8 Krishna Nagar, PB No 9415, Delhi 110051; Ph: 213845; Prop: S K Bhatia; Head, Vet Inst Div: S P Bhatia.

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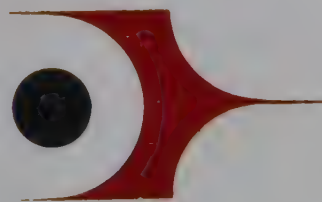
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NATIONAL REFRIGERATION WORKS, 2 & 3 Netaji Subhash Marg, Daryaganj, New Delhi 110002; Ph: 274041-42, Gram: Kooling; Partner: Ashok Kumar Sahdev. Product: Cold storage, deep freezers, chilling plants, heat exchangers, etc.

NEEKA TUBES LTD (A wholly-owned subsidiary of Gujarat Steel Tubes Ltd), Bank of India Bldg, Bhadra, Ahmedabad 380001; Ph: 343841 (5 lines), Gram: Neekatubes, Tlx: 0121-699 & 266; Chmn: Apoorva Shah; Dir: S T Parikh; Dep Gen Mgr (Mktg): Pradip Desai; Asst Mktg Mgr: M A Kamalwala. Works: 114-123A GIDC, Vatva Indl Estate, Vill Vinzol, Ahmedabad 382445; Ph: 877567, Tlx: 0121-595. Branches -- Bangalore: 62 Silver Jubilee Park Rd, -560002; Ph: 228092, Gram: Steelpipes, Tlx: 0845-8224; Bombay: 712-715 Tulsiani Chambers, 212 Nariman Point, -400021; Ph: 223941, 223942, 223943, 230969, Gram: Bestpipes, Tlx: 011-2831; Calcutta: Commerce House, 2 Ganesh Chandra Avenue, -700013; Ph: 278204, 266146, Gram: Tuffweld, Tlx: 021-2427; Ludhiana: 790 Indl Area 'B', -141003; Ph: 24671, Gram: Sunflames, Tlx: 0386-384; Madras: Agurchand Mansion, 151 Mount Rd, -600002; Ph: 82722, 88807, Gram: Gujartube, Tlx: 041-7848; New Delhi: Tinson House, 2nd Floor, 54 Janpath, -110001; Ph: 352552, 321179, Gram: Bestpipes, Tlx: 031-3313; Secunderabad: 5-5-89/32, Sara Iron Market, Ranigunj, -500003; Gram: Steelpipes, Tlx: 0155-6971. Products: Stainless steel pipes -- welded, seamless, cold drawn, annealed, inside pickled, outside polished for milk lines and evaporators.

NESTLER BOILERS PVT LTD, 55-56 Dalmal Chambers, Sir V Thackersey Rd, Bombay 400020; Ph: 290335, 295569, Gram: Nestler, Tlx: 011-3334; Mg Dir: Shirish R Shah.



NEW OKHLA ENGINEERING AND TRADING COMPANY PVT LTD, Dairy Div, B-195 Okhla Indl Area Phase I, New Delhi 110020; Ph: 632415, 6832776, Tlx: 31-63194 CHDA IN; Dirs: H S Chadha, Ph (resi): 532255, M P S Chadha, Ph (resi): 7119050, B S Chadha, Ph (resi): 7215121. Contact Off: 137 Rajindra Mkt, Tis Hazari, Delhi 110054; Ph: 2511416, 2518477. Product: Electronic milk tester. Brand Name: NETCO.



NICHROME METAL WORKS, 46 Dr Ambedkar Rd, Near RTO, Pune 411001; Ph: 62137, 67310, Gram: Nichrome, Tlx: 145-451 NMV IN; Mg Partners: S V Joshi, P B Paranjape; Gen Mgr (Mktg): Col S N Viswanathan (Retd); Gen Mgr (Ops): V D Gupte; Asst Mgr (Mktg): S P Kane. Products: Automatic form, fill, seal machines for packing milk, ghee, milk powder, etc; horizontal form, fill, seal machine; packaging machine for single service sachets; electronic weigh filler; on line check weigher; custom built automatic container filling line; crate washing eqpts. Marketed by: Voltas Ltd, Machine Tools Div. Brand Names: Autowrap, filpack, multipack, sampack, unipack, weighguard, weighmaster.

NIRMAL TRADERS, 111 Wadala Udyog Bhawan, Wadala, Bombay 400031; Ph: 4129127, 4120201; Managing Partner: A D Doshi, Ph off: 4129127, 4120201. Products: Dealers of Alfa-Laval (I) Ltd dairy equipment.

NYFORM, G/128-129 Ansa Indl Estate, Saki Vihar Rd, Bombay 400072. Products: Stainless steel moulds for ice cream, etc.

OLYMPUS REFRIGERATION & ENGINEERING CORPN, Yeyyadi Indl Estate, Mangalore 575008; Ph: 27285, Gram: Olympus; Chief Exec: K S Rao; Mgr: C S Paul. Products: Bottle coolers, deep freezers, farm coolers, ice cream machinery, milk coolers, pasteurizers, pressure vessels, tanks. Brand Name: Olympus.

OSAKA ELECTRONICS ENTERPRISES, 122 Vithal Udyognagar, Vallabh Vidyanagar 388121, Gujarat; Ph: 7404, Tlx: 0172-211; Partners: T V Gandhi, A M Patel. Products: Control panels.

P J SUROTIA & CO, Near Chakudia Mahadev, Rakhial, Ahmedabad 380023; Ph: 366576. Products: Dairy processing eqpts.

PAHARPUR COOLING TOWERS PVT LTD, 8-1/B Diamond Harbour Rd, Calcutta 700027; Ph: 458956, Gram: Woodjoiner, Tlx: 021-3293. Branches -- Bombay: Manek Mahal, Veer Nariman Rd, -400020; Ph: 2044831, Tlx: 011-3812; New Delhi: 25 Community Centre, East of Kailash, -110065; Ph: 6431763, 6431766, Tlx: 031-2099. Products: Process cooling eqpt.

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PANCHAL WORKSHOP, THE, Anand Sojitra Rd, PB No 62, Anand 388001; Ph: 3332, Gram: Varsha; Partners: Shantilal Panchal, Parvin Panchal, Dinesh Panchal, Ghan-shyam Panchal, Yogesh Panchal, Rohit Panchal. Products: Automatic/manually operated packing and filling machines for milk powder, cheese, oil, ghee, shrikhand; tin sterilisers, conveyers, tin elevators, tin vibrators, etc; cattle feed plant equipments.

PARAGON ENTERPRISE INDUSTRIES, 27 GIDC Indl Estate, Nandesari 391340, Dist Baroda; Ph: 261, Gram: Paragon; Prop: R M Rathod; Tech Mgr: V P Sobti. Product: Feed Plants. Brand Name: Paragon.

PARAS DAIRY APPLIANCES, 52-54 Mint Rd, Bombay 400001; Ph: 260013, 268917, Gram: Emmisary; Partners: Vijay P Shah, Chhotalal R Shah. Product: All types of dairy eqpt. Brand Name: Paras.

PASTEUR ENGINEERING COMPANY (P) LTD, 15/8/A The Mall, Dum Dum, Calcutta 700080; Ph: 573015, Gram: Dairytank; Mg Dir: D N Samanta; Dir: B K Mandal. Products: Drum dryer, homogeniser, other such items. Brand Name: PEC.

PATEL TRUNK FACTORY, Mahatma Gandhi Rd, Anand 388001; Ph: 1319. Products: AI & frozen semen eqpt, milk testing eqpt.

PEICO ELECTRONICS & ELECTRICALS LIMITED, Shivsagar Estate, Block 'A', Dr A B Rd, Bombay 400018; Ph: 4921500, Gram: Philihio, Tlx: 011-73722; Mg Dir: M C Guepin; Divl Mgr: P Goswamy. Regl Offices — Bombay: Bandbox Bldg, 254-D, Dr A B Rd, -400025; Ph: 4930590, 4930311, Gram: Philiband, Tlx: 011-71540; I & E Mgr: M Raju; Calcutta: 7, Justice Chandra Madhab Rd, -700020; Ph: 473621, Gram: Phililite, Tlx: 021-7310; I & E Mgr: S K Sen; Madras: No 3, Haddows Rd, -600006; Ph: 472341, Gram: Phililite, Tlx: 041-499; I & E Mgr: V S Soundararajan; New Delhi: 68 Shivaji Marg, -110015; Ph: 5430153, 5430159, Gram: Phililite, Tlx: 031-3142; I & E Mgr: G C Aggarwal. Products: Liq-uid Nitrogen Plants 6 l/hr and 25-30 l/hr.

PENWALT INDIA LTD, 507 Kakad Chambers, 132 Dr A B Rd, Worli, PB No 9901, Bombay 400018; Ph: 4932702, 4932267, 4930496, Gram: Pennwalt, Tlx: 011-75091 PENN IN; Mg Dir: S D Kashyap; Dev Mgr: P N Pastakia; Mgr, Ops: V K Vicharay; Mgr, Engg: J F Goveya. Branch Offices — Calcutta, Delhi, Hyderabad. Products: Sharples, Super-D Canter, Sharples Super Centrifuge, Sharples Gravitrol.

PERFECT ENGINEERING WORKS, 2162/T-10 Palco House, Shadikhampur, New Delhi 110008; Ph: 568730; Mg Ptnr: T N Khattar; Ptnr: Ravi Khattar; Sales Exec: R K Khurana. Factory: 487/10 Peera Garhi Chowk, Delhi 110041. Products: Stainless steel conveyor chain, ss pipe-fittings, bottling eqpt, precision engineering components.

PERKS ENGINEERING, B/24 New Empire Indl Estate, Kondivita Rd, Andheri (E), Bombay 400059; Ph: 6326349, 6347745, Gram: Perkspacks; Chief Exec: P M Katrak; Mktg Mgr: R N Daver. Products: Shrink packaging, vacuum sealing machines, stretch wrapping machines, skin/blister packing thermo forming machines. Brand Name: Perks.

PERMIONICS, 5/11 Industrial Estate, Górwá Rd, Vadodara 390016; Ph: 82953; Mg Partner: Satyapal Mayor, Ph (resi): 63081. Products: Water treatment plants and ultra filtration plants.

PEST CONTROL (INDIA) PVT LTD, Yusuf Bldg, M G Rd, PB No 1510, Bombay 400023; Ph: 251546, 251594, Gram: Pestcil, Tlx: 011-5166; Mg Dir: N S Rao. Branch — New Delhi: 7 Jantar Mantar Rd, PB No 581, -110001; Ph: 312568/9, 320519, Gram: Pestcil, Tlx: 031-4836; Mgr: V S Tavanandi. Product: Flying insect control system. Brand Name: Pest-O-Flash.

PICDAN HEAVY EQUIPMENT LTD, M-26 Commercial Complex, 1st Floor, Greater Kailash-II, New Delhi 110048; Ph: 6413902; Mg Dir: M M Malik; Gen Mgr: Arun Kumar. Product: Effluent treatment plant.

POLYGLASS FIBRE INDUSTRIES, 265 Okhla Indl Estate, New Delhi 110020; Ph: 630701, 633025; Partner: J S Bawa. Product: Insulated fibreglass tanks.

POLY PLAST, Thakore Industrial Estate, Premier Automobiles Rd, Vidyavihar (W), Bombay 400086; Ph: 5133009, 5135450, Gram: Yourfriend; Mg Partner: M A Shah, Ph (resi): 462255; Partner: L A Shah. Products: FRP milk storage tanks, reaction vessels, pressure and vacuum vessels, exhaust blowers & fume extraction systems, scrubbers & absorption towers, chemical resistant lining.

PORRITS & SPENCER (ASIA) LTD, 308 Kanchenjunga Bldg, 18 Barakhamba Rd, New Delhi 110001; Ph: 3313866, 3312537, 3312582; Dir: K C Tapadar. Products: Industrial filter fabrics.

POWER & INSTRUMENTATION, 12 Sunshine Indl Estate, Rakhial, Ahmedabad 380023; Ph: 364271. Products: Motor control centre, distribution boards, control panels and switch boards.

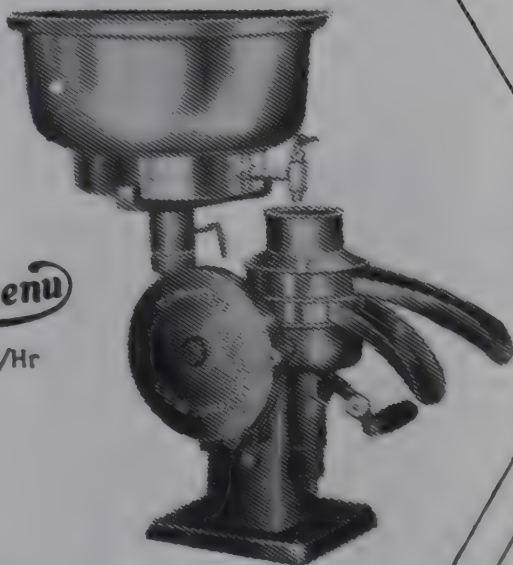
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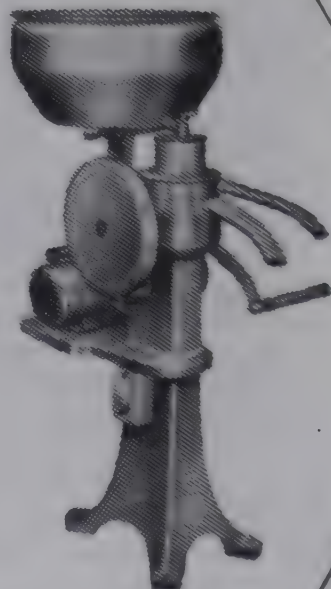


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Gram : LISTERMAKE • Telex : 031-66029 SMI IN

POWER EQUIP, 900/1/B, GIDC, Makarpura, Baroda 390010; Ph: 42004, Gram: Power-equip; Partner: Prabodh K Thakkar, Ph (resi): 556014. Products: Animal feed plants, material handling eqpt, hammer mills, mixers, belt bucket elevators; conveyors: screw/chain/salt/belt/control.

POWER MECH, 769 GIDC, Makarpura, Baroda 390010; Ph: 42004, Gram: Powermech. Product: Material handling eqpt.

POWERICA SALES & SERVICES (P) LTD, 210 Commerce House, Medow's St, Fort, Bombay 400023. Products: Diesel generating sets.

PRABSONS, C-2, 103B Lawrence Rd, Delhi 110035; Ph: 741477; Partners: Anil Kapoor, Sunil Kapoor; Chief Exec: R C Kapoor. Factory: 14/34 Libaspur, Master Mohalla, Near Harijan Barat Ghar, Delhi 110042. Products: Milk road tankers, milk storage tanks and ghee kettles. Brand Name: Prabsons.

PRACTICAL ELECTRONICS CORPORATION, PB No 62, Anand Sojitara Rd, Anand 388001. Products: Seaming machines.

PRECISION EQUIPMENT CO, Gajjar House, Astodia Rd, Ahmedabad 380001; Ph: 342766/67, Gram: Instrument, Tlx: 0121-502; Mg Partner: N K Shah. Liaison Off: 30 Mahakali Chawl, Pydhonie, Bombay 400003; Ph: 328242, 323386. Products: Cart and lorry weighbridges. Brand Name: Everest. (Mktg and servicing by Blue Star Ltd).

PRECISION MACHINERY CO (PVT) LTD, L-61 Connaught Place, New Delhi 110001; Ph: 311112; Dir: J P Agarwal.

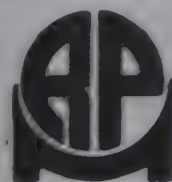
PRESIDENT SURGICAL CO, A-5/17 Krishan Nagar, Near Lal Quarter, Delhi 110051; Ph: 212080; Prop: Chaman Lal Bhatia. Products: Vet instruments & AI eqpt. Brand Name: President.

PRIME FABRICATORS PRIVATE LIMITED, 72 Janpath, New Delhi 110001; Ph: 352321, 352578, 352625, 352694, Gram: Skimmilk, Tlx: 031-2969 SKIM IN. Products: Dairy, food and chemical industry equipments and specialised agitators.

PROCESS EQUIPMENTS, 79/1 'S' Block, MIDC, Bhosari, Pune 411026; Ph: 82130, 82567, Gram: Process, Tlx: 0146-278 PROC IN; Prop: Dilip V Chawathe; Sr Exec: Ashok Kanetkar. Branch: 622 Maker Chamber V, Nariman Point, Bombay 400021. Product: All types of dairy and chemical machinery including road milk tankers, milk storage tanks, silos, milk reception eqpt, chilling plants and milk pasteurising plants.

PROCESS MACHINERY & EQUIPMENT PVT LTD, 8-A S P Mukherjee Rd, Calcutta 700025; Ph: 478561; Dirs: A P Gomar, S B Ghose, Ph (resi): 467289. Product: Dairy plant eqpt, food processing machinery and chemical plants.

R K MACHINE TOOLS (PVT) LTD, Industrial Area, Ludhiana; Chmn: R K Soni. Branch: C-517 Safdarjung Dev Area, New Delhi 110016; Ph: 660020. Products: Dairy equipment fabrications.



R P M ENGINEERS, 14 N P Developed Plots, Industrial Estate, Ekkattuthangal, Madras 600097; Ph: 431639; Prop: M R Prasad, Ph (resi): 423165; Works Mgr: S Sivasubramonian. Products: Sterilizers, stainless steel jacketted vessels, can scrubbers, ghee boilers, khoa-pan, can conveyor arrangements, milk storage tank (horizontal/vertical), milk reconstitution plant and ice cream plants.

RAJ ENTERPRISES, Near Krishna Hall, Sardar Gunj, Anand 388001. Products: Supply erection and insulating of pipe line and ducting line.

RAJ MECHANICAL INDUSTRIES, 410 Industrial Area 'A', Ludhiana 141003; Ph: 23897, 25748, 37152, Tlx: 0386-269; Mg Partners: I M Dhandra, A K Dhandra. Brand Name: Raj.

RAJ TIN WORKS, Raj House, Subhash Rd, Anand 388001; Ph: 909; Mg Partner: Saifuddin H Tinwala. Factory: Near Vadod & Khetivadi crossing, Anand; Mgr: Roshanali S Tinwala. Products: Aspiration piping for feed plant and other eqpt. Brand Name: Raj.

RAJAN STEEL FABRICATORS, 56 GIDC Estate, Odhav, Ahmedabad 382415; Ph: 887759, Gram: Rajansteel; Partners: Chhabildas H Shah, Ajaykumar C Shah, Dilip J Shah, Rajan C Shah, Suvarana V Shah. Products: Feed plant eqpt, pressure vessels, air receivers, heat exchangers, structural fabrication work.

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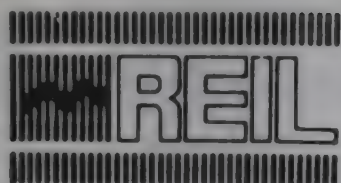
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(A public sector enterprise), 2 Kanak-pura Indl Area, Sirsi Rd, Jaipur 302012; Ph: 61883, 62271, Gram: Reil, Tlx: 0365-403 REIL IN; Gen Mgr: K B Agrawal; Dep Gen Mgr: C K Sharma; Sr Engr: S Bhargava. Marketing Div: D-37 Madho Singh Rd, Bani Park, Jaipur 302006; Ph: 63308. Products: Electronic milk tester (EMT); Milko Scan 104 A/B, Solar Photovoltaic (SPV) system for street lighting, water pumping, community television, feed cropping and SPV custom built for individual requirements & oil seed moisture meter. Brand Name: REIL.

RAJESH MEDICAL AGENCIES, 11-34-3 (East)
Bhav Narayan St, Vijayawada 520001; Ph: 75437; Prop: B S R K Arya, Ph (resi): 61528. Product: Milk testing equipment.

RAM KUMAR & BROS, Ram Ganj Crossing, PB No 61, Etawah 206001; Ph: 456, Gram: Ram-kumar Bros; Partners: R A Mittal, Ravi Mittal. Branch: 29/156 Raja Mandi Bazar, 1st Floor, Agra. Products: Aluminium caps, butter making eqpt, milk testing eqpt, milk procurement eqpt, glassware. Brand Name: Rakbro.

RATNAMANI METALS & TUBES PVT LTD, Latif Bldg, 1st Floor, Opp Central Bank of India, Rewdi Bazar, Ahmedabad 380002; Ph: 335202, Gram: Ratnamani; Mg Dir: Arvind D Sanghvi, Ph off: 877539, 877457; Sales Mgr: M V Havnurkar. Branch: Ratnamani Industries, 44 C P Tank Rd, Bombay; Ph: 360044, 389470; Mgr: B D Sanghvi. Product: SS dairy pipes. Brand Name: RMTPL.

REED MEDWAY PACKAGING COMPANY OF INDIA PVT LTD, D-4 Paschimi Marg, Vasant Vihar, Post Bag No 6, New Delhi 110057; Ph: 671175, Tlx: 031-63161; Mg Dir: V G Malani; Commercial Dir: D G Malani. Product: High-speed packaging machinery including bag closing machines and electronic weighing machinery systems.

REGAL SCALE INDUSTRIES, 17-B Bhaktinagar Indl Estate, Rajkot 360002; Ph: 42623, 44083, Gram: Lion; Mg Partner: J C Patel; Partner: K J Patel. Products: Milk weighers, weigh-bridges. Brand Name: Lion.

RELIANCE HEAT TRANSFER PVT LTD, 46 Veer Nariman Rd, Fort, Bombay 400023; Ph: 2046510, Tlx: 011-4375; V S Sarmalkar.

RICHARDSON & CRUDDAS (1972) LTD (A Govt of India Undertaking), Byculla Ironworks, Sir J J Rd, PB No 4503, Bombay 400008; Ph: 866832-39, Gram: Ironworks, Tlx: 011-75662; Chmn & Mg Dir: S K Mahapatra; Gen Mgr (BIW): V G Mangrulkar; Gen Mgr (Mktg): K K Sharma. Products: Stainless steel vessels with agitators, milk storage tanks, transportation tanks, industrial refrigerators, deep freezer, ice-cream freezer.

RITA AGENCIES, 55, III Main Rd, Gandhi Nagar, Madras 600020; Ph: 412698, 414115, Gram: Garkel, Tlx: 041-6545 RITA IN; Mg Partner: Rajan Syal, Ph (resi): 412831; Chief Exec: Vinay Syal. Products: Nagema Bottling Plants.

ROLLATAINERS LIMITED, Packaging Div, 13/6 Mathura Rd, Faridabad 121003; Ph: (82)-5319, 5342, 5372, 5392, Gram: Rolapak, Tlx: 0343-323 RLPK IN; Dir: Ramesh Bhargava, Ph off: 6419801, 6433225, resi: 611275, 624475; Gen Mgr: S R Chakravarty, Ph (resi): 6439070; Comm'l Mgr: Sanjaya Varma, Ph (resi): 663526; Asst Sales Mgr: S Balasundaram. Delhi Off: 407 Deepali, 92 Nehru Place, New Delhi 110019. Products: Ceka packaging systems, Ceka lined cartons, Ceka automatic packers and automatic weigh fillers.

ROPLAS (INDIA) LTD, 145 Bombay-Poona Rd, Pimpri, Poona 411018; Ph: 83915, 83916, 84272, Tlx: 0145-350; Mktg Mgr: N N Ramachandran. Products: FRP insulated tanks and milk vending units.

ROTO PUMPS & HYDRAULICS PVT LTD, 308 Osian Bldg, 12 Nehru Place, New Delhi 110019; Ph: 6418513, 6435339, Gram: Rotosales, Tlx: 61817; Mg Dir: N K Gupta; Jt Mg Dir: H C Gupta. Regd Off: 162-B Cooperative Indl Estate, Kanpur 208022; Ph: 221616, 221168, Gram: Rotosales, Tlx: 300. Branches: Asansol, Bangalore, Bombay, Calcutta, Dhanbad, Nagpur, Vadodara. Product: Pumps. Brand Name: Roto.

RUBY COACH BUILDERS PVT LTD, 86-92 M Vasanji Rd (Andheri-Kurla Rd), Marol Naka, Bombay 400059; Ph: 6044331; Dirs: D S Kapashi, H M Kapshi, I S Kapashi, S S Kapashi. Products: Milk tankers/vans.

SBM ENGINEERING PRODUCTS PVT LTD, SBM Bhavan, Rd No 15, Wagle Indl Estate, Thane 400604; Ph: 594157. Product: Feed plant equipment.

SAGAR MARKETING PRIVATE LIMITED, 'Firdos', B Mehta Rd, Shahibaug, Ahmedabad 380004; Ph: 65111-2-3, Gram: Sagar, Tlx: 0121-401; Chmn: Gauttam C Shah, Ph off: 66665, resi: 66774/5; Dir: M B Umarvadia, Ph (resi): 463865; Sales Exec: K J Desai.

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SAGAR TRADING CO, Dairy Rd, Near Rly Nala, Mehsana 384002; Ph: 31118; Mg Partner: H K Rayaka, Ph (resi): 22134. Product: Milk testing equipment.

SAGAR TRADING CORPORATION, Goverdhan Rd, Mathura 281004, UP; Partner: P C Agarwal. Products: Dairy and scientific eqpts and appliances.

SALESWORTH INDIA PVT LTD, Analytical Instruments Div, 907 Dalamal House, Jammalal Bajaj Marg, Nariman Point, Bombay 400021; Ph: 231669, 224803, Tlx: 011-2942 SWPL IN; Mg Dir: S K Bagaria; Regl Mgr: K V Venugopalan. Branches — Bangalore: Shankar House, 1 Rajmahal Vilas Extn, Mekhri Circle, -560080; Ph: 369203, Gram: Salesworth, Tlx: 0845-8319 FOS IN; Mgr: Dr Hemnalini Desai; Calcutta: 17 Ganesh Chandra Ave, -700013; Ph: 265012, Gram: Bioworth, Tlx: 21-5384 BTEC IN; Mgr: Nasirul Alam; New Delhi: 38 Lok-nayak Bhawan, Prithviraj Lane, Near Khan Mkt, -110003; Ph: 617211; Mgr: Dr V K Gupta. Product: Bottleneck machines.



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SAPTAGIRI ENGINEERS, 5-1-290 Old Ghasmandi, Secunderabad 500003. Factory: C-10, CIE Balanagar, Hyderabad. Products: SS milk tanks, Rail/road milk tankers.

SARABA METAL WORKS, 6/1-A Trunk Rd, Porur, Madras 602104; Ph: 432180; Prop: P Sundaram; Tech Mgr: K Pichumani. Products: SS milk storage tanks, refrigeration plants. Brand Name: Saraba.

SAURASHTRA PACKAGING PVT LTD, Pattani Bldg, M G Rd, Rajkot 360001; Ph: 22331, 87371, Gram: Supack, Tlx: 0169-314 PACK IN; Mg Dir: M K Mehta, Ph: 87993. Branch: 606

Churchgate Chambers, 5 New Marine Lines, Bombay 400020; Ph: 293495, Gram: Supack, Tlx: 011-4018. Factory: Bajwa Ginning Mill Compound, Bajwa 391010, Dist Baroda; Navagam (Anandpur), Rajkot. Products: Corrugated boxes. Brand Name: Supack.

SCIENTIFIC EQUIPMENT WORKS, 1/777 Nicholson Rd, Delhi 110006; Ph: 227029, 236205, Gram: Chembio; Dirs: C P Sood, P N Sood. Product: Laboratory equipment.

SEVEN HILLS INDUSTRIES, 8-A Thiruvengadam Rd, PB No 1013, Coimbatore 641002; Ph: 26341; Prop: G Sarojini; Gen Mgr: S D Govindarajulu. Branch: 950 Poonamalli High Rd, Madras 600084; Ph: 666299. Products: Coolers, double jacketed vessels, insulated milk storage tanks, road milk tanker, silos. Brand Name: Sevenhills.

SHAH & CO ASSOCIATES, 27/28 GIDC Estate, Opp Creata Cold Storage, Odhav, Ahmedabad 382415. Products: Diesel generating sets.

SHAH PATEL & CO, 63 Nagdevi Cross Lane, Bombay 400003; Ph: 338547, 324309. Product: Boiler tubes.

SHREPAK BROTHERS, A-1/606 GIDC, Makarpura, Baroda 390001; Ph: 43253, Gram: Shrepak, Tlx: 0175-458; Partners: Shremik H Amritlal, Padmak H Amritlal. Products: Sieving and straining separators, pneumatic conveying eqpt. Brand Name: Shrepak.

SHRIRAM TEMP-X-CHANGERS (INDIA), 991/2/A GIDC, Opp Makarpura Bus Depot, Baroda 390010; Gram: Tempex; Mg Partner: A J Chavadia. Products: Bulk butter carton filling machine, ghee boilers, pasteurizers, rotary can/tin filling machine, bottle filling machine, jacketed pans, level gauges, sugar and paste mixer, dairy products manufacture eqpt.

SIEMENS INDIA LTD, Electric Mansion, 134/A Dr A B Rd, Worli, Bombay 400018; Ph: 4938786, 4937403. Products: Control panels/switchboards.

Taj

SIGMA SALES SERVICE, 3544 Nicholson Rd, Mori Gate, Delhi 110006; Ph: 2523830, 2928437; Mg Partner: Raghunandan Sharma; Partner: Jagnandan Sharma, Ph (resi): 237172. Products: Aging vats, ice cream freezers, homogenizers, ice cream cabinets and refrigeration plants, pasteurizer vats, softy machines, surface coolers. Brand Name: Taj.

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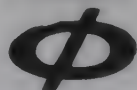
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SILA INDUSTRIES, E/1 Industrial Estate,
Gorwa, Vadodara 390016; Ph: 82412, Gram:
Sila; Mg Dir: Smt Vinodini S Mayor, Ph
(resi): 63081. Products: Milk vending
units and storage tanks.

SINGLASS FIBRE LTD, 802 GIDC Industrial
Estate, PB No 93, Ankleshwar 393002,
Gujarat; Ph: 2015, 2347, Gram: Singlass;
Chmn: I Chatterji; Dirs: Sanjeev Muker-
jee, S P Pandit, S B Motivala, Mrs S I
Chatterji, Ashok Chatterji, Rajiv Chinu-
bhai; Chief Exec: J Lakhani; Tech Asso-
ciate: M N Dass. Regd Off: 8A Seaface
Park, B Desai Rd, Bombay 400026; Ph:
8227866. Products: FRP insulated milk
vending units.

SINGHAL UDYOG (REGD), 345/363 Azad Market,
PB No 1037, Delhi 110006; Ph: 513713,
526871, Gram: Dairytrade; Prop: Madan
Mohan Singhal, Ph (resi): 526212. Pro-
ducts: Cream separators, milk testing
eqpt. Brand Name: Singhal.



SINHAL METAL INDUSTRIES PVT LTD, C-56/1
Wazirpur Indl Area, Delhi 110052; Ph:
7114375, 7121971, 741575, Gram: Lister-
make, Tlx: 031-66029 SMI IN; Mg Dir:
Pawan Kumar; Sales Dir: Kailash Sinhal.
Sales Off: Sinhal Sales, 61-A Khanna
Market (near Tis Hazari), Delhi; Ph:
2521549, 2512826. Products: Cream sepa-
rator machines, butter churner, butter
worker, milk cans, milk testing eqpt
and its accessories. Brand Names: Kam-
dhenu, Minion and Sinhal.

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stone, Faridabad 121003; Ph: 5367, Gram:
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Bhati; Dep Gen Mgr: Onkar Chadha.
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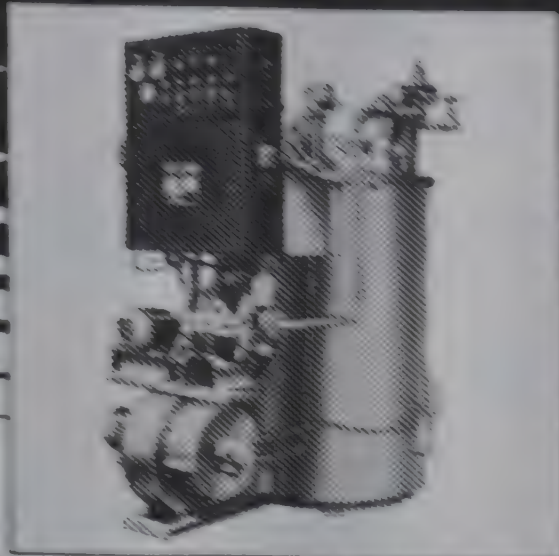
SOMANI INTERNATIONAL CORPORATION, 1510 Maker
Chamber V, Nariman Point, Bombay 400021;
Ph: 230344, 223543, 223549, Tlx: 011-4050
SIC IN; Pres: Vinay R Somani, Ph (resi):
296705, 317532. Products: Animal breeding
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Batch freezers; Butter/cheese processing
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lines; ear tags and applicators; Pregnancy
detectors; chillers and refrigeration
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paper cup manufacturing machines; ice
cream sandwich machines; ice sorbet
machines; ice cream stick and ice lolly
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ing machines; milkshake and slush dis-
penser; nut/fruit feeder; pasteurizers;
ripple machine; softy ice cream freezer;
soyamilk machines; tramper pumps; UHT
milk and juice processing plant.

SPECTOMS ENGINEERING PVT LTD, Purshottam
Estate, Bahucharaji Rd, Baroda 390018;
Ph: 559920, 559496, Gram: Spectoms,
Tlx: 0175-334; Mg Dir: Arvind A Shah,
Ph (resi): 66653; Dir: Navin A Shah.
Product: Feed mixing eqpt, silos.
Brand Name: Spectoms.

SRI VENKATESWARA INDUSTRIES, 2 Vinayagar
Koil St, Porur, Madras 602104; Ph:
431226; Prop: K S Ramachandran. Pro-
ducts: Insulated milk storage tanks,
dump tanks, milk warmers, ghee boiler,
bottle sterilizer, khova pan, cheese
vat, cheese press, cheese hoops, butter
table, butter shovel, plunger, sampling
dippers, road milk tankers, insulated
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Grams : Dudhgaon, Meerut

Ested 1974

Phone : 736

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766, Chaupla Idgah, Baghat Gate, Meerut-2 (U.P.)

STAINCO ENTERPRISES PVT LTD, 405 Kusal Bazar, 32-33 Nehru Place, PB No 4211, New Delhi 110019; Ph: 6431983, Gram: Staico; Mg Dir: N Dasgupta; Dir, Proj: S Dasgupta; Chief Exec: R K Ray; Gen Mgr, Works: M M Saha. Factory: 15/2 Mathura Rd, Faridabad 121002. Products: Spray drying plants, Turn-key project & fabrication of stainless steel equipment for dairy.

STAINLESS & STEEL PRODUCTS CO (A unit of M/s Faridabad Stainless & Steel Products Co (Pvt) Ltd), 19 DLF Indl Area-II, 13/4 Mathura Rd, Faridabad 121003, Haryana; Ph: 82-5441, Gram: Esespee, Tlx: 0343-286; Chief Exec: R P Banerjee; Exec Dir: Tapas Chatterjee, Ph (resi): 637446. Products: Multi stage evaporating plant; spray drying plant; Two stage driers; Malted milk plant, milk chillers; CIP unit ejector system; powder conveying system; milk silos; storage tanks; pumps for evaporators, etc. Specialisation in expansion of existing powder plants and supply of new powder plants. Brand Name: SSP.

STANDARD FABRICATORS (INDIA) PVT LTD, Jeevan Sahakar, Sir P M Rd, Bombay 400001; Ph: 296867, Gram: Spinwell, Tlx: 011-2647; Comm'l Mgr: K A Kelekar. Products: Evaporators, filter presses, heat exchangers, material handling eqpt, pressure vessels, pumps, ss fabrications.



STANDARD ROOFINGS PVT LTD, Peddibhotlavari St, Governor Pet, Vijayawada 520002; Ph: 63931, 63201 PP; Mg Dir: P Satyanarayana, Ph (resi): 74110; Dir (Mktg): K H Prasad; Dir (Production): K P C Rao. Factory: Sri Kalahasthi Indl Estate, Rachaguneri, Chittoor Dist, AP; Ph: 23 (Maddiledu). Regl Off — Hyderabad: 5-9-36 Basheerbagh, -500029; Ph: 223015; Dir: M Krishnamurthy; Tirupati: 18-1-274 Umamaheswar Bldgs, Bhavani Nagar, -517501; Ph: 2439 (PP). Products: Asphaltic roofing sheets and accessories. Brand Name: Standard Roof.

STAN-REL PRIVATE LIMITED, Ramukteswar Rd, Pratapnagar, Baroda 390004; Ph: 52241; Mg Dir: Navnitlal D Shah; Mgr: K N Shah. STAR FREEZE INDUSTRIES, Gazdar House, Dhobi Talao, Bombay 400002; Ph: 291332, 298343.

Products: Freezers, milk coolers, ice candy plants with ice cream machines, cream separators, etc.

STAYBRIGHT EQUIPMENT CO (P) LTD, 38 NDSE Part I, New Delhi 110049; Ph: 698928, Gram: Agroprodct; Mg Dir: A Mookerji, Ph (resi): 6410305. Products: Cheese vats, condensed milk plant, evaporating plant, ghee boilers, road tanker barrels, storage tanks.

STITCHWELL QUALITEX, G-58 Sector VI, Noida 201301, Dist Ghaziabad; Ph: 4647, 3973, Gram: Qualitex; Mg Partner: S N Sud; Partner: Dinesh Sud, Ph (resi): 4584, 3658. Products: Automatic weighing and bag closing machines. Brand Name: Stitchwell-Qualitex.

STORMAC INDIA LTD.

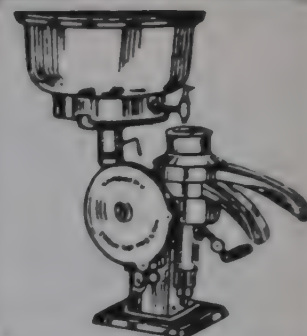
STORMAC INDIA LIMITED, Regd Off: 27 Nariman Bhavan, Nariman Pt, Bombay 400021; Ph: 243198, 243163, Tlx: 011-5154. Factory: NIDC, Near Lambha Vill, Post Narol 382405, Dist Ahmedabad; Ph: 397344, 399190, Gram: Stormac, Tlx: 0121-326; Chmn: Atul K Bhagwati; Chief Exec: P P Joglekar. Selling Agents: Stork Dairy Div, ATE Private Ltd, 43 Dr V B Gandhi Marg, Fort, Bombay 400023; Ph: 244771, Gram: Coratex, Tlx: 011-2118. Liaison Offices — WESTERN REGION: Mistry Chambers, Khanpur, Near Cama Hotel, Ahmedabad 380001; NORTHERN REGION: ECE House, 3rd Floor, 28-A Kasturba Gandhi Marg, New Delhi 110001; EASTERN REGION: Narayani Bldg, 27 Brabourne Rd, Calcutta 700001; SOUTHERN REGION: 28-A Race Course, PB No 3828, Coimbatore 641018. Foreign Principals: Messers Stork Amsterdam B V, Netherlands. Products: UHT milk treatment plants, homogenisers, centrifugal milk pumps, pasteurisers, milk chillers, ss storage tanks and vessels, milk tankers.

STRUCTURES & VESSELS, 20/26 Old Market, West Patel Nagar, New Delhi 110009; Ph: 585531. Products: Dairy and Pharmaceutical plants eqpt.

SUMITOMO CORPORATION, Maker Chambers VI, 4th Floor, Nariman Point, Bombay 400021; Ph: 2022060, 2022081, 2022705, Gram: Sumitshoji & Sumitomo, Tlx: 2470, 4335; General Manager: S Tada. Product: Bottling plants.



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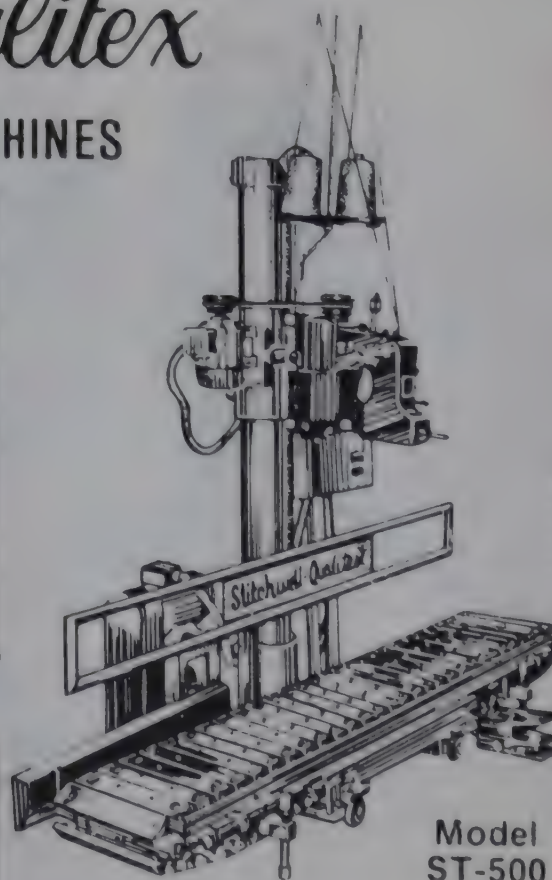
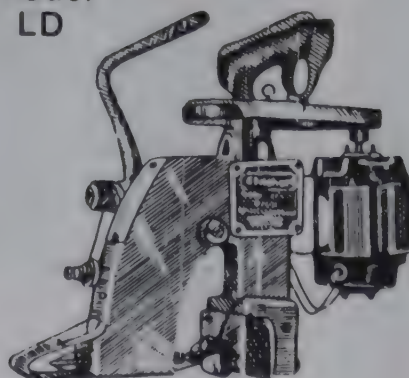
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SUNDARAM INDUSTRIES LIMITED, 211 South Velli St, Madurai 625001. Product: Road tankers.

SUNDER SINGH & CO PVT LTD, 1/6 Roop Nagar, Delhi 110007; Ph: 2919834, 2912334 & 2516845. Products: Compressors & refrigeration eqpt.

SUPER GLASS INDUSTRIES, Amul Dairy Rd, Anand 388001; Ph: 1594; Prop: S B Soni. Products: Milk testing eqpt.

SUPREME INDUSTRIAL WORKS, 196-K Gaiwadi, Girgaum, Bombay 400004; Ph: 355189. Product: Air-conditioning plant.

SUVIK ELECTRONICS PVT LTD, Nowroji Vakil Compound, Police Lines, Shahibag, Ahmedabad 380004; Ph: 332465, 385729. Product: Milk cryoscopes.

SVED ENGINEERS (P) LTD, Sved House, PB No 9436, Bombay 400093; Ph: 6321492, 6320392, Gram: Devsved. Product: FFS machines.

SWASTIK MANUFACTURERS LIMITED, 1-7-1060 Azamabad Indl Area, Musheerabad PO, Hyderabad 500020; Ph: 61501, 62677 (factory), Gram: Essemell; Mg Dir: S Narayana Prasad, Ph (resi): 64396; Mgr, Finance: Vijay Raghava N Prasad; Mgr, Factory: H C Damodar; Mgr, Production: Ravi N Prasad. Product: Chaff cutters.

SWASTIK SAFE & IRON WORKS PVT LTD, Mahatma Gandhi Rd, Anand 388001; Gram: Swastik-saf; Mg Dir: A P Panchal, Ph (resi): 406. Regd Off & Factory: Vallabh Vidyanagar Rd, Anand; Ph: 141. Products: Can conveyor/scrubber/washer, feed plants, dairy plant eqpt.

SWITCHGEARS CONTROLS & SYSTEMS, CE-10 Vithal Udyognagar, Vallabh Vidyanagar 388120, Gujarat; Ph: 7414, Gram: Systems. Products: Motor control/power control centres, switchboards.



TAJ INDUSTRIES, 766 Chaupla Idgah, Baghpat Gate, Meerut 250002; Ph: 73687, Gram: Dudhcans. Products: Ice chambers, milking pails, plungers, tinned mild steel milk cans of 10 to 60 litres capacity.

TEXMACO LIMITED, Boiler and Pressure Div, Agarpara, Calcutta 700056; Ph: 581713-15, Gram: Texsteam, Tlx: 021-7606, 021-2415; Chmn: K K Birla; Pres: R Maheshwari; Vice-Pres (E&M)-BPV, SM & CPM: S Kumar. Works: Agarpara, Belgharia, Pani-

hat, Sodepur. Branches — Ahmedabad: H K House, Ashram Rd, -380009; Tlx: 012-317; Bombay: 254-A Dr A B Rd, Worli, -400025; Ph: 4935746, Tlx: 011-71041; Coimbatore: 333 Avarashi Rd, -641018; Tlx: 0855-288; Madras: 622 Mount Rd, 2nd Floor, -600006; Ph: 812977, Tlx: 041-408; New Delhi: 305 Vishal Bhawan, 95 Nehru Place, -110019; Ph: 6416311, Tlx: 011-3837; Divl Mgr: Rajinder Batra. Products: Heat exchanger, pressure vessels, sugar plant, smoke tube boiler (ranging 150 kg/hr to 70,000 kg/hr), waste heat recovery, water tube boiler.

THAKOR DAIRY MACHINERY SUPPLIES CO, Kalpesh Estate, near Laxmi Cinema, Subhash Rd, Anand 388001; Ph: 871, Gram: Canwasher; Chief Exec: B R Mistry; Partner: D A Doshi. Works: C 1 B Shed No 6, GIDC Estate, Vithal Udyognagar 388121; Ph: 7317. Products: Bottle washing machine, butter carton transporter trolley, can scrubber, conveyors, casein vat, cheese paraffining, crate washer.

THERMAX PRIVATE LIMITED, Corporate Off: Thermax House, 4 Bombay-Pune Rd, Shivajinagar, Pune 411005; Ph: 51125, 51138, Gram: Thermax, Tlx: 0145-545 TMXS IN; Chmn & Mg Dir: R D Aga; Dir (Mfg): K K Kabraji. Plants: (a) MIDC Area, Chinchwad, Pune 411019; (b) Resins & Chemical Plant: 97E Bhosari Industrial Area, Pune 411026. Regl Offices — Bombay: Dhanraj Mahal, Ch Shivaji Maharaj Marg, -400039; Regl Mgr: Nitin Warty; Calcutta: Park Plaza, 71 Park St, -700016; Regl Mgr: Asis Ray; Madras: 610 Anna Salai, -600006; Regl Mgr: P S Thiagarajan; New Delhi: 9 Community Centre, Basant Lok, Vasant Vihar, -110057; Regl Mgr: P Suryanarayan. Products: Packaged and field erected boilers, liquid/vapours phase heaters; hot air/water boilers; waste heat recovery reutilisation systems; absorption chillers; water treatment plants and system. Brand Names: Steamax, Multitherm, thermopac.

THERMOAIR CORPORATION, 3 Sawan Ashram, Shakti Nagar, PB No 2170, Delhi 110007; Ph: 7129479, factory: 532047. Products: Centrifugal blowers, chillers, filters, freezers, refrigeration plants.

TROIKA PROCESSES PVT LTD, 607 Embassy Centre, Nariman Point, Bombay 400021; Ph: 234429, Gram: Trochnics, Tlx: 011-5335; Mg Dir: P G Bhandari; Dirs: O P Agarwal, R S Jhaveri, R K Chopra. Product: Feed mixing plants.

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- Dairy & Laboratory Chemicals.
- All Types of Thermometers.
- Milk Cans—Aluminium Alloy, Aluminium & M.S.
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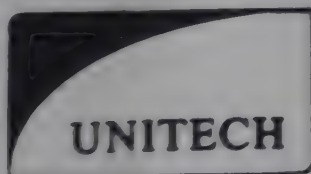
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UNICORN MACHINERY MANUFACTURERS LTD, 13/1 Rasulpura, PB No 1687, Secunderabad 500003; Ph: 821122, Gram: Unimach, Tlx: 0425-6646 UNIL IN; Managing Director: B C Sanghani; Directors: M R K Reddy, U Balaraj, Rajesh B Sanghani; Production Mgr: D Jaivant; Marketing Mgr: D Vijay Kumar Rao. Products: Dairy equipment; Turnkey projects for dairy. Brand Name: Unicorn.

UNIQUE AEROVENT PVT LTD, 177 Vidyanagari Marg, Kalina, Santacruz (E), Bombay 400098; Ph: 6125812, Gram: Aerovent; Mg Dir: R B Totlani, Ph (resi): 526280. Products: Centrifugal fans, blowers, axial flow fans, air curtains and circulators, roof ventilators, exhaust fans, bag filters, cyclones, scrubbers, flame proof fans, rotary air-lock feeders, rotary piston vacuum pumps. Turnkey Projects: Industrial ventilation, pressurisation and cooling with humidificator, fume extraction and scrubbing systems, dust collection systems.



UNITECH ENGINEERS PRIVATE LIMITED, 6th Km Delhi Rd, PB No 119, Saharapur 247001; Ph: 7370, 7053, 7054, Gram: Unitech, Tlx: 0596-206 TECH IN; Mg Dir: M M Chhabra; Dir Works: V K Chhabra; Dep Mgr (Production): M L Verma; Dep Mgr (Plg): Sudhir Jain; Dep Mgr (QC): S C Narula; Sr Exec (Sales): T S Ramachandran; Sr Exec (Export & Liasion): K C Walia; Mgr: S K Gupta. Branch: B-211 Chittaranjan Park, New Delhi 110019; Ph: 6414896, 6431155, Gram: Unisystem, Tlx: 031-4750. Products: Chilling units, pasteurizing and processing equipments; Tanks, vats and vessels; Rail/road tankers; ghee boilers; Silos and other equipment for dairy industry. Brand Name: Unitech.

UNITECH MACHINES LIMITED, Regd Off: B-211 Chittaranjan Park, New Delhi 110019; Ph: 6414896, 6431155, Tlx: 031-4750; Mg Dir: V K Chhabra. Works: 10th Km Delhi Rd, Saharapur 247001; Ph: 7370, Tlx: 596-206

TECH IN. Products: Rail/road milk tankers, tanks, silos, pasteurization plants, chillers, evaporation and spray drying plants, ghee boilers, heat exchangers, cream tanks, casein making eqpts, complete milk chilling plants on turnkey basis.

UNIVERSAL COMMERCIAL CORPORATION, 11 Netaji Subhash Marg, Daryaganj, New Delhi 110002; Ph: 271131. Products: Ice cream eqpt.

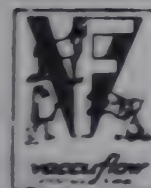
UNIVERSAL DAIRY, Mahavir Rd, Anand 388001; Ph: 4031, Gram: Parcream; Mg Partner: C V Doshi; Partner: K V Doshi. Products: Milk testing eqpt and cream separators.

UNIVERSAL SURGICAL CO, D4/8 Krishan Nagar, Lal Quarter, P B No 9406, Delhi 110051; Ph: 213845; Prop: S P Bhatia. Products: All types of surgical instruments and AI eqpts. Brand Name: Unisc.

UTILITY ENGINEERS (INDIA) LTD, 16 Shopping Centre, Panchsheel Park, New Delhi 110017; Ph: 6437309, 6437335, 6436716; Mg Dir: Anil Bhardwaj. Product: Airconditioning and refrigeration eqpt.

V K ENGINEERING & PLASTIC INDUSTRIES, Sona Udyog Industrial Estate, Building No 4, Block 9, Parsee Panchayat Rd, Andheri (East), Bombay 400069; Ph: 6325364/5837. Product: Coextruded film.

V P G TRADING, 7/7-A Avanashi Rd, Chinniam-palayam, Coimbatore 641062; Ph: 87456; Prop: A S Varadharajan. Products: Feed mixing eqpt. Brand Name: VPG.



VACCUFLOW INDUSTRIES, A-42 Chandranagari, Salisbury Park, Pune 411001; Ph: 63602, Gram: Esjamart; Partner: F M Bhatt. Regd Head Off: Ogalevadi 415105, Dist Satara, Maharashtra; Ph: 3131, 2901 (Karad Ex); Mg Partners: Mukund S Ogale, Hemant M Ogale. Products: Milking machines (Tech Collaborators: Strangko, Denmark), water bowls, cow mats, milk chillers and AI eqpts (Ovascan, Boveq).

VARSHA BOILERS PVT LTD, 505 Churchgate Chambers, 5 New Marine Lines, Bombay 400020; Ph: 254232, 297724; Mg Dir: D D Joshi, Ph (resi): 573102. Product: Boilers.

VENTURA FABRICATION PRIVATE LIMITED, Tulsi Vihar, Dr A B Rd, Worli Naka, Bombay 400018; Ph: 4932090, 4932099, 4933289, Gram: Ventfab, Tlx: 011-75014; Mg Dir: L M Rajpal, Ph (resi): 216030, 211943; Gen Mgr (Mktg): R N Bhavnani, Ph (resi):

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Post Box No. 16, Vithal Udyognagar 388121

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522291. Factories: Bilimora, Thane. Products: Ventilation and air pollution control eqpt. Brand Name: Ventura.

VERDI REHRI STORES, 88 Ram Nagar Market, Delhi 110055. Products: Push carts, etc.

VIJAIPAC ENTERPRISES, 25 A & B, Electronic Complex, Kushaiguda, Hyderabad 500762; Ph: 852556, Gram: Vijaipac. Products: Form fill seal machines.

VINAY TRADING COMPANY, D C Rd, Ambala Cantt 133001; Ph: 20821, Gram: Dairyman; Ptnrs: I S Jain, P K Jain. Products: Milk testing eqpt, lab apparatus.

VISCO ENTERPRISE, 31 Shreenath Industrial Estate, Mahakali Caves Rd, Andheri (E), Bombay 400093; Ph: 6322756, Gram: Visco-prise; Prop: Vijay Sheth, Ph (resi): 6142814. Products: Thermoforming packaging machinery.



VISHAL EQUIPMENTS, B-54 APIE, Balanagar, Hyderabad 500037; Ph: 263822, Gram: Vish-altank; Mg Partner: D Amritlal, Ph (resi): 64901; Partner: M Gyamal; Works Mgr: P G Kamalan; Sales Mgr: A Philipose. Products: Dairy plant eqpt, butter/cheese/ghee making equipment, CIP units, ice-cream eqpts, conveyors, refrigeration, storage tanks, silos, road milk tankers.

VOLTAS LIMITED, Airconditioning & Refrigeration Div, 19 J N Heredia Marg, Ballard Estate, PB No 900, Bombay 400038; Ph: 268131, Gram: Airvol, Tlx: 2239; Gen Mgr (Ops): B R Banerjee. Products: Milk chilling plants. Brand Name: Voltas.

WARM STREAM, Anand-Sojitara Rd, PB No 22, Vithal Udyognagar, Vallabh Vidyanagar 388121, Gujarat; Ph: 7443; Mgr, Tech & Sales: Sharad Amin. Products: Automatic fluid heaters, chemical vessels, dryers, pressure vessels, steam boilers, chemical eqpts and solar water heating systems.

WEST COAST ENGINEERING WORKS PVT LTD, 301 Udyog Mandir No II, Mogul Lane, Mahim, Bombay 400016; Ph: 453700, 458949, 467665, Gram: Antiskid, Tlx: 011-71052 WEST IN; Mg Dir: J M Shah; Sales Mgr: K K Upadhyaya; Mgr: R M Pande; Works Mgrs: P H Gawankar, P K Sarkar. Products: Anti-skid gratings, Anchor stairtreads, Hi-flow tower rings (pall rings), Tuf-tiles.

WESTERWORK ENGINEERS LIMITED, 5D Vulcan Insurance Bldg, Veer Nariman Rd, Church-

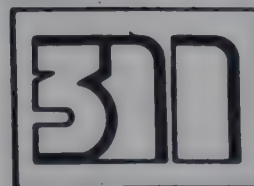
gate, Bombay 400020; Ph: 220147, 220163, Gram: Westerwork, Tlx: 11-3017 WEC IN; Chmn & Mg Dir: B R Thadhani, Ph: 220519; Dir: H M Kapadia, Ph off: 4941985; Gen Mgr (Mktg): N S Talwar, Ph (resi): 531862. Head Off: Commerce Centre, Tardeo Rd, Bombay 400034; Ph: 4946661, 4942987.

Branches — Bangalore: Seaton Engineers, No 78 DDA Commercial Complex, Indiranagar, -560038; Ph: 578039; Calcutta: 8/A Circus Avenue, -700017; Ph: 445888; New Delhi: 805 Pragati Tower, 26 Rajendra Place, -110008; Ph: 5717312. Products: Special heat treatment furnances, packaged steam and hot water boilers, combustion systems, valves, material handling eqpt, etc. Brand Name: Westerwork.

WIEGAND INDIA PRIVATE LIMITED, 22-D Nizamuddin East, New Delhi 110013; Ph: 621908, 621913, 618226, Tlx: 31-62312; Dir: B P S Puri, Ph (resi): 389557. Products: Heat recovery systems, evaporating plants, high vacuum eqpt, ejectors, scrubbers, process plants, packaging systems. Brand Name: Wiegand.

WIMA (INDIA), Plot No 33, Odhav Industrial Estate, Ahmedabad 380023; Ph: 887721. Product: Boilers.

WIPERDRIVE ENTINEERING, Noble Chambers, 11 Ghoga St, Fort, Bombay 400001; Ph: 256770, 250819, Tlx: 011-5475; Partner: Hemen B Shah. Product: Conveyor chains.



3M BOILERS PVT LTD, Vidyadhar Heights, 4th floor, 243 Narayan Peth, Laxmi Rd, Pune 411030; Ph: 442269, 37915, Gram: Threem, Tlx: 0145-333, 0145-505 MCCI Care 3M; Mg Dir: Surendra Deshpande. Branch: N-195 Greater Kailash-I, New Delhi 110048; Ph: 6439133, 6434449, Tlx: 31-65724 GESY IN; H Vikram. Products: Oil fired steam boilers, hot water boilers, liquid phase heater, vapor therm, Aqua stat liquo therm.

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AGRICULTURAL IMPLEMENTS & BRASS UTENSILS, Court Rd, Jagadhari 135003; Ph: 24048, 26649, Gram: Aibu; Mg Ptnr: S B Bansal. Product: Aluminium Milk Cans. Brand Name: AIBU.

ANANDLOK INTERNATIONAL, G-127 Kalkaji, New Delhi 110019; Ph: 6432632, 6417802, Gram: Makhanchor; Mg Partners: Dr A K Choudhery, S C Choudhery. Product: Vacuum Packaging Machine (Manufactured by: Rossherwerke, West Germany).

ANUP ENGINEERING LIMITED, THE, Dairy Div, behind 66 KV Electric Sub-station, Odhav Rd, Ahmedabad 382415; PB No 1158, Ahmedabad 380002; Ph: 364621, 364622, Gram: Anupam, Tlx: 012-327; Mg Dir: Arun P Sheth; Sales Mgr: Udayan Shah. Branch: 603 Hemkunt House, 6 Rajendra Place, New Delhi 110008; Ph: 5711056, 5712880, Tlx: 031-3557. Representatives — Bombay: Asmi Associates, 98 Dadasaheb Phalke Rd, Rupal Apartment, -400014; Ph: 447895, Tlx: 011-3952; Calcutta: Ace Distributors, 10 Pollock St, -700001; Ph: 262986, Gram: Singhisons, Tlx: 021-7361; Secunderabad: Emkay Engg Enterprises, 10-12-282 Seethphalmandi, -500361. Products: Aluminium milk cans, butter churns, cheese vats, cream vats, cream vat pasteurizers, dump tanks or milk receiving tanks, ghee kettles, ghee straining tanks, milk evaporators, milk storage tanks, milk vat pasteurizers.

ARCTIC INDIA SALES, 20 Rajpur Rd, Delhi 110054; Ph: 2522424, 231129, Gram: Arcticind, Tlx: 031-61203 AISL IN; Prop: Deepak Pahwa, Ph (resi): 2516926; Mktg Asst: Ms Mamta Saxena. Branches: Bangalore, Bombay, Calcutta. Products: Dehumidifiers, Heat recovery systems. Brand Name: Bry-Air.

ASIATIC ODYGEN & ACETYLENE CO LTD, 8 B B D Bag East, Calcutta 700001; Ph: 204247,

204241, 204259, Gram: Asioxygen, Tlx: 021-5527; Pres: P Kishore. Branches: Aurangabad, Barauni, Howrah, Kumhari, Nagpur, Tinsukia. Products: Liquid Nitrogen Containers and Tanks.

AVON SURGICALS, 56 Cantt Rd, Lucknow; Ph: 45836, 49998; Partners: Gurbaksh Singh, Pritam Singh. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

BHAGWATI SUPERVAC PVT LTD, 56 Shrimali Society, Navrangpura, Ahmedabad 380009; Ph: 442466, Factory: 887958, Gram: Bhavicast, Tlx: 0121-630; Mg Dir: L N Bhagwati, Ph (resi): 442466; Mktg Exec: Jwalant M Desai. Products: Vacuum packaging machines. Brand Name: Supervac.

BHORUKA ENGINEERING INDUSTRIES LTD, Whitefield Rd, Mahadevapura Post, Bangalore 560048; Ph: 58345, Gram: Besteel, Tlx: 0845-646 BSL IN; Vice Pres: A K Barman. Product: Cryogenic equipment.

BRY-ATR INDIA PVT LTD, 20 Rajpur Rd, Delhi 110054; Ph: 2522424, 231129, Tlx: 031-61203 AISL IN; Mg Dir: Deepak Pahwa, Ph (resi): 2516926. Products: Dehumidifiers, Heat recovery systems.

BUBBER MACHINE TOOLS, 407 Dalamal Chambers, 29 New Marine Lines, Bombay 400020; Ph: 252284, 251403, Gram: Kombipack, Tlx: 011-3021. Products: Can making machines.

BUCKAU WOLF INDIA LTD, Pimpri, Pune 411018; Ph: 84461, Gram: Buckau, Tlx: 146-267. Product: Processing machine. Brand Name: Supraton.

CHADHA ELECTRO INDUSTRIES, 27 O Y I Scheme, DSIDC Indl Complex, Delhi 110041; Prop: Manjeet Singh Chadha, Ph (resi): 7119050. Product: Dairy appliances.

CROLL REYNOLDS VACUUM SYSTEMS (INDIA) PVT LTD, "Devasan", Ramakrishna Kunj Society, Atira Rd, Ahmedabad 380015; Ph: 460427, Tlx: 0121-539; Mg Dir: Rohit Shah. New Delhi Off: Krishna Mathur & Associates, 2659 Roshanpura, Nai Sarak, Delhi 110006; Ph: 276943, 6448191. Products: Custom-built system for ejectors and thermocompressors for evaporating plants.

DAIRYING & ALLIED CONSULTANCY SERVICES, Kothi No 51, Phase VII, Mohali 160061, Chandigarh; Ph: 87993; Mg Dir: G B S Kahlon. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

DECO GLASS INDUSTRY, Subhash Rd, Near Laxmi Cinema, Anand 388001; Ph: 1384 PP; Partner: C J Shah. Products: Milk Butyrometer and other glassware.

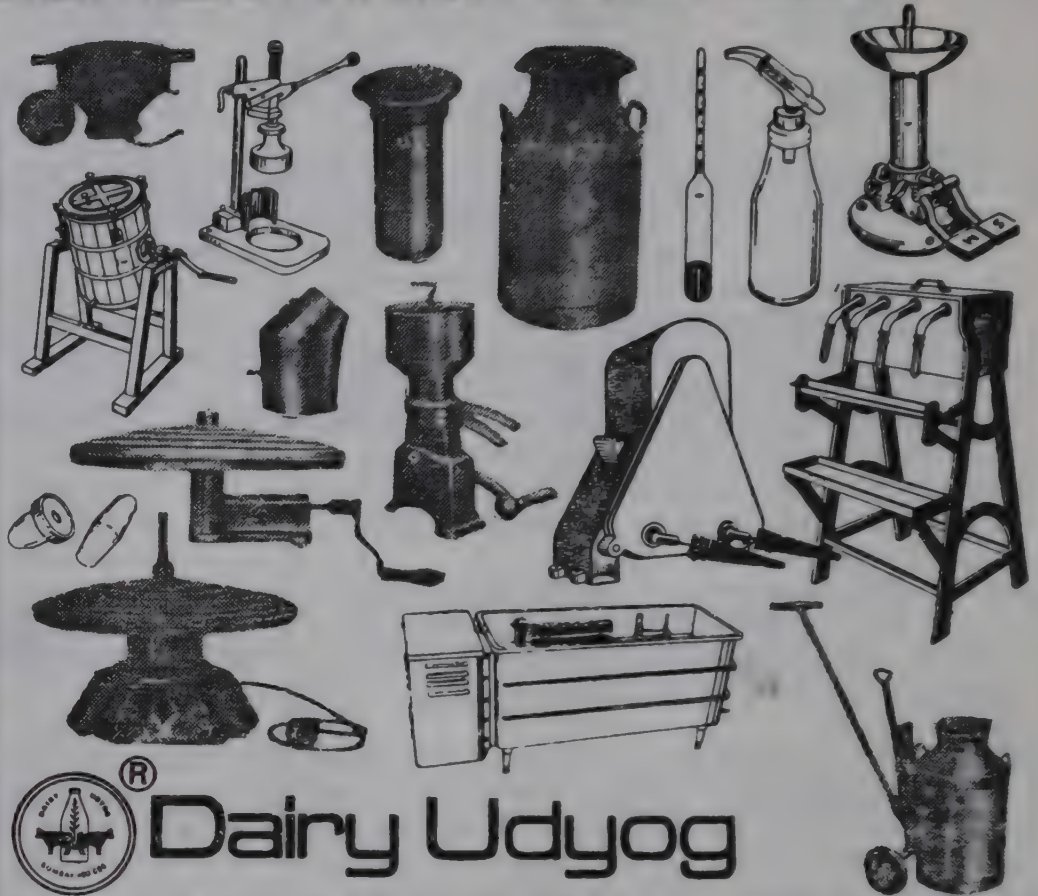
EVERYTHING FOR DAIRY DEVELOPMENT

**YOU
NAME IT**

WE HAVE IT...

Milk Testing Centrifuge
Machines, Accessories
For Testing Milk. Milk
Sampling, Sealing
Equipments & Bottle
Crates. Milk Bottles, &
Can Steaming Block,
Draining Rack, Milk Cans
& Utensils & Trolleys.
Cream Separators
Cleaning Brushes. Can
trolleys & Can Scrubber

Gram: DAIRYUDYOG'



Dairy Udyog

Ghatkopar Ind. Estate, Block 'C', Unit No. 229 A, L. B. Shastri Marg, Ghatkopar (W),
Bombay 400 086 • Phone: 58 68 78 • 58 49 60

SRI VENKATESWARA INDUSTRIES

No 2, Vinayagar Koil Street,
Porur
Madras 602104.

Manufacturers of:

**STAINLESS STEEL MILK WARMERS,
INSULATED TANKS**

Specialists in

Kitchen, Canteen, Chemical and Resturant equipments.

EEE CEE & CO, 1 Anant Indl Estate, Opp Comet Fruit & Chemicals, Rakhial, Ahmedabad 380023; Ph: 368311, Grams: Extraheat; Prop: Yogendra J Patel, Ph (resi): 400860; Sr Exec (Mktg): A G Desai. Product: Sealing machines.

F H DESIGN AND PROCESS SPECIALITIES, C-132 Dayanand Colony, 2nd Floor, Lajpat Nagar, New Delhi 110024; Prop: Feroz Hussain. Products: Cheese vats, pressure vessels, ghee boilers.

FOREMOST ENGINEERS (P) LTD, 1407 Court Rd, Saharanpur 247001; Ph: 7935; Mg Dir: R K Jain, Ph (resi): 7471, 7809; Exec Dir: Sanjay Jain. Products: Cream storage tanks, ghee boilers, Horizontal & vertical ss tanks, road milk tankers.

GEETEE ENTERPRISES, 3 Chittaranjan Avenue, Calcutta 700072; Ph: 233974, Gram: Es-beech; Prop: Guha Thakurta, Ph (resi): 461111. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

GENERAL SCIENTIFIC SUPPLIER, Nevil Rd, Etawah 206001; Prop: R K Kushwaha. Product: Laboratory appliances. Brand Name: GSS.

HIMACHAL LIASION AGENCY, 48 Middle Bazar, Shimla; Ph: 6117; Prop: Parvesh Kumar. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

HINDUSTHAN THERMOSTATICS, Temperature House, 5 Industrial Estate, Ambala Cantt 133001; Ph: 20391, Gram: Optima; Partner: Y K Jain. Products: Butyrometers and all types of glassware, etc.

HYDERABAD INDUSTRIES LIMITED, Sanatnagar, Hyderabad 500018; Ph: 262401 (10 lines), Gram: Asbestos, Tlx: 0155-210; Mktg Div (Plg & Dev): P Ramachandra Rao. Products: Roofing structures. Brand Name: Charminar Minikor.

JEMCO INDUSTRIES, 66 Smith Gunj, Delhi Gate, Meerut 250002; Mg Partner: Jamil Ahmed; Partner: S Ahmed. Factory: 11 Sabun Godam, Baghpat Rd, Meerut 250002; Ph: 8744. Products: MS milk cans, milking pail, ice chambers, plungers.

JERE, V K, 34 Budhwar Peth, Near Jogeshwari Temple, Pune 411002; Ph: 443571. Representative of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

K I A & Co, 230 Arun Chambers, Tardeo Rd, PB No 7927, Bombay 400034; Ph: 4942213, 4941922, Gram: Krinap, Tlx: 75630 NINU; Mg Partners: S G Tanwani, A G Tanwani. Products: Form-fill & seal machines, Pouch making machines, Mixers, Butter

packing machines. Brand Name: KIA.

KEHEMS CONSULTANTS PRIVATE LIMITED, 25 Dhenu Market, 1st Floor, Indore 452003, MP; Mg Dir: D K Kemkar, Ph (resi): 5619; Systems Engr: C M Gupta. Product: Thermal energy storage system. Brand Name: Cristopia STL.

LALSONS & CO, A-45 Rewari Line, Mayapuri Industrial Area, Phase I, New Delhi 110064; Ph factory: 594230; Sales Off: 2529070, 2929070; Partners: Avinash Chandra Shahi, Prakash Chandra Shahi. Products: Boilers, compressors. Brand Name: Lalsons.

M K INDUSTRIES, A-12, Gali No 4, Anand Parbat Indl Area, New Rohtak Rd, New Delhi 110005; Ph: 5723331; Chief Exec: Dhanjal Singh. Product: Bottling plants.

M S CHADHA & SONS, 5/11, 42 DLF Indl Area, Kirti Nagar, New Delhi 110015; Ph: 532255; Partners: M S Chadha, T P S Chadha. Products: Milk testing machines, Cream separators. Brand Name: Original IMMCO.

MASER ELECTRONICS PVT LTD, 75 Vishal Indl Estate, Opp Ceat Tyres, Bhandup, Bombay 400078; Ph: 5600036, Tlx: 011-4220 FIR IN; Mg Dir: T S Ramachandran, Ph off: 294348, 294653. Product: Ultrasonic Pest Repellor. Brand Name: Maser.

NARANG SCIENTIFIC INDUSTRIES, 3545 Timber Market, Ambala Cantt 133001; Ph: 20754; Prop: H D Narang. Products: Milk testing equipment. Brand Name: Aman.

NAVEEN SCIENTIFIC INDUSTRIES, Lactowin House, Near B D High School, Ambala Cantt; Ph: 22592, 22398, Gram: Lactowin; Prop: Amrit Lal Aggarwal, Ph (resi): 20698; Sales Exec: Manjeev Aggarwal. Products: Milk-ghee-powder testing equipment, lock stopper, lactometer, centrifuges, milk cans, butyrometers, pipe fittings, tilt measure, etc. Brand Name: Lactowin.

NEELAM AGENCIES, Naveen Villa, C-28 Raja Park, Near Ice Factory, Jaipur 302004; Ph: 41297, Gram: Vetneelam; Prop: B S Sapra, Ph (resi): 43012. Representatives of Daaps Cryogenics Pvt Ltd and Daaps Breeding Products Pvt Ltd.

PECOPP PRODUCTS, Opp Portuguese Church, Dadar, Bombay 400028; Ph: 4229947, 4220594; Mg Partner: C V Balwani; Ph factory: 8729957, resi: 6409860; Mktg Mgr: P T Sudarsan. Product: Fly controlling units. Brand Name: Pecopp Insectocutor.

PROCESQUIP PROJECTS PVT LTD, 40/8 Ballygunge Circular Rd, Calcutta 700019; Ph: 478738, Gram: Pharmequip, Tlx: 021-2006 PROC IN;

Mg Dir: S Basu; Sr Exec: S Gupta; Mktg Mgr: T S Gupta; Resident Rep: 17 Pushp-
rag, Goshala Rd, Mulund (W), Bombay
400080; Ph: 5612296. Products: Processing
and packaging machinery from Cherry Bur-
rell Amca International, USA.

RAJASUNDARY INDUSTRIES, Unit No 12, Sidco
Indl Estate, Theni 626531, Madurai Dist,
Tamil Nadu. Product: AI equipment.

RAM G DEO & SONS, 506 Shaniwar Peth, Kaka-
saheb Gadgil Rd, Mehunpura, Pune 411030;
Ph: 470597, Gram: Virtue; Prop: Shrikant
R Deo, Ph (resi): 449132. Factory: 113
Hingne Khurd, Vithalwadi, Pune 411051;
Ph: 470739. Products: MS milk cans and
lids, ice cans for ice factories. Brand
Name: RGD.

S S R GLASS INDUSTRIES, B-209/1 Naraina
Indl Area, Phase I, New Delhi 110028;
Ph: 533100, 535773; Prop: Sunil Kapoor,
Ph (resi): 531351. Products: Butyro-
meters, lockstoppers, pipettes and
glass equipment. Brand Name: Rahul, Sunny.

SELECT PACKAGING MACHINERY, 159/160 Sidco
Indl Estate, Ambattur, Madras 600098;
Ph: 653017, Gram: Prepac; Mg Dir: R K
Patel, Ph off: 653125, fac: 656814; Gen
Mgr: M Srikrishna. Branches: Bangalore,
Baroda, Bombay, Calcutta, Delhi, Hydera-
bad & Madras. Products: Blister packing
machine, Blister Pack-170 machine, Shrink
wrapping machine, Sealing machines, Skin
packing machine, Thermoforming machine.

SHAKTI ENTERPRISES, 87/B-1 East Azad Nagar,
Delhi 110051; Prop: Narender Bhatia.
Product: AI & Veterinary instruments.

SPACE ELECTRICALS, Hundiwale Apartments,
Opp Mirani Nagar, Kopri Colony, Thane
(East) 400603, Maharashtra; Gram: Space-
lec. Product: Impulse sealing electrodes.

TECHNO-EQUIPMENTS, 31 Parekh St, Saraswati
Sadan, Near Girgaum Court, Bombay 400004;
Ph: 351258, Gram: Foodequip; Mg Partner:
S S Netravalkar, Ph fac: 5515640, resi:
351258; Partner: P V Sardesai. Products:
Bottle filling machine, bottle washing
machine, ss tanks. Brand Name: Techno.

TATA ENGINEERING AND LOCOMOTIVE COMPANY LTD
(TELCO), Army & Navy Bldg, 148 Mahatma
Gandhi Rd, Bombay 400023; Ph: 245020; Mgr
(Sales): G A Puthran. Product: Road milk
tankers.

TAYLOR INSTRUMENT COMPANY (INDIA) LTD, 14
Mathura Rd, PO Amar Nagar, Faridabad; Ph:
82-5303, 82-5446; Pres: R D Sharma; Exec
Vice-Pres: A K Ladha; Asst Vice-Pres
(Mktg): B Kannan. Products: Level

indicators, temperature controllers/
recorders and other instruments.

TROPICAL REFRIGERATION INDUSTRIES, B-8 Deep
Shikha, Rajendra Place, New Delhi 110008;
Ph: 5717342, 5718966. Product: Labora-
tory equipment.

TYCO (INDIA) PVT LTD, 4F Neelambar Bldg,
28B Shakespeare Sarani, Calcutta 700017;
Branch: 310 Padma Tower, 1 Rajendra
Place, New Delhi 110008. Product: Weigh-
ing and Bagging Machines. Brand Name:
Tyco-Velox.

VIJAY STEEL INDUSTRIES, near Arya Samaj,
Station Rd, Anand 388001; Ph: 1024;
Partners: Jashbhai A Patel, Mukesh J
Patel. Products: SS pipe fittings/
valves, feed plant equipment. Brand
Name: Vijay.

VINOSHA BOILERS PVT LTD, 204 Chandan Cham-
bers, 138 Modi St, Fort Market, Bombay
400001; Ph: 261515, Tlx: 011-76004; Mg
Dir: Vinod U Shah. New Delhi Off: Krishan
Mathur & Associates, 2659 Roshanpura,
Nai Sarak, Delhi 110006; Ph: 276943,
6448191. Products: Steam boilers, tray
dryers.

Your Attention Please!

If you have an entry in the YEARBOOK, you may
suggest the names of individuals/organizations
who do not at present appear but whom you
consider worthy to be included in the Yearbook.

Please send us a postcard with names and
addresses of any suitable persons/organizations to
whom we will be glad to send a data form.

DAIRY INDIA YEARBOOK

A-25 Priyadarshini Vihar, Delhi 110092.
Phones: 2243039, 2243326

Buyer's Guide

This handy Buyer's Guide lists suppliers of equipment productwise under two main groups: Dairy Husbandry and Dairy Processing. The address and other details of each of these companies can be obtained from the main listing.

DAIRY HUSBANDRY

A.I. EQUIPMENT

AI Consumables

Daaps Breeding Products
Private Limited
Indian Dairy Machinery Co
Patel Trunk Factory
Somani International Corpn

Cryogenic Containers, etc

Bharat Heavy Plates &
Vessels Ltd
Bhoruka Engineering Indus-
tries Ltd(Late additions)
Daaps Cryogenics Pvt Ltd
IEP Co Ltd
Indian Oxygen Ltd
Industrial Gases Ltd
Larsen & Toubro Ltd

Liquid Nitrogen Plants

Acme Manufacturing Co Ltd
Bharat Heavy Plates &
Vessels Ltd
Hindustan Livestock Sales
Corporation
Indian Oxygen Ltd
Peico Electronics &
Electricals Limited

AI & Veterinary Equipment

Daaps Breeding Products
Private Limited
National Meditek
President Surgical Co
Shakti Enterprises
(Late additions)
Universal Surgical Co
Vaccuflo Industries

CATTLE FEED PLANTS

B I Industries
Gardeners Corporation
Hardcase Engineering Works
Private Limited
Jayems Parkim Pvt Ltd
Kiran Engineering Works
Kristam Engineers Pvt Ltd
Panchal Workshop, The
Paragon Enterprise Industries
Power Equip
Spectoms Engineering Pvt Ltd
Swastik Safe & Iron Works
Pvt Ltd
Troika Processes Pvt Ltd

Plant Accessories

Advance Electronics
Armcess Engineers Pvt Ltd
Bharat Process & Mechanical
Engineers Ltd
Cremach Designs
Industrial Engineers
Raj Tin Works
Rajan Steel Fabricators
Recoton Engineering Corpn
SEM Engineering Products
Pvt Ltd
VPG Trading
Vijay Steel Industries
(Late additions)

CHAFF CUTTERS

Hardcase Engineering Works
Private Limited
Jyoti Limited
Swastik Manufacturers
Limited

MILK TESTING EQUIPMENT

Electronic

Foss Electric India
New Okhla Engineering &
Trading Co Pvt Ltd
Rajasthan Electronics &
Instruments Ltd

Mechanical

Capital Scientific Industries
Chadha Sales Pvt Ltd
Continental Instruments (I)
D G S Company
Dairy Appliances Co
Dairy Equipment Company
Dairy Udyog
Deco Glass Industry
(Late additions)
Devang Corporation
Doshi & Sons
Gandhi Trading Co
General Scientific Supplier
(Late additions)
Hindustan Thermostatics
(Late additions)
Indian Dairy Equipment Co
Jupiter Glass Works
Kishor Trading Corporation
Lakshmi Milktesting
Machinery Co
Laxmi Scientific Industries
M C Dalal & Co
M S Chadha & Sons
(Late additions)
Malhotra Scientific Glass
Works
Mulakh Raj & Co
Narang Scientific Industries
(Late additions)
Naveen Scientific Industries
(Late additions)

Paras Dairy Appliances
 Patel Trunk Factory
 Rajesh Medical Agencies
 (Late additions)
 Ram Kumar & Bros
 SSR Glass Industries
 (Late additions)
 Sagar Trading Co
 Sagar Trading Corporation
 Singhal Udyog (Regd)
 Sinhal Metal Industries
 Private Limited
 Super Glass Industries
 Universal Dairy
 Vinay Trading Co

MILKING MACHINES

Jyoti Limited
 Somani International Corpn
 Vaccuflow Industries

ROOFING STRUCTURES

Hyderabad Industries Limited
 (Late additions)
 Light Roofings Ltd
 Modern Roofings Ltd
 Standard Roofings Pvt Ltd

DAIRY PROCESSING

BOILER SYSTEMS

Boilers

Batliboi & Co Ltd
 Bharat Heavy Plates &
 Vessels Ltd
 Carolex (India) Pvt Ltd
 Energy Machine
 Greaves Cotton & Co Ltd
 IAEC (India) Ltd
 Indra Fabricators
 Industrial Boilers Pvt Ltd
 Jaya & Co
 Kessel Engineering Co
 Kristam Engineers Pvt Ltd
 Lalsons & Co (Late additions)
 Lipi Boilers Pvt Ltd
 Nestler Boilers Pvt Ltd
 Texmaco Limited
 Thermax Pvt Ltd
 Varsha Boilers Pvt Ltd
 Vinosha Boilers Pvt Ltd
 (Late additions)

Warm Stream
 Westerwork Engineers Ltd
 3M Boilers Pvt Ltd

Accessories (Burners, Pipe-fittings, etc)

Advance Tube Co
 Greaves Cotton & Co Ltd
 IAEC (India) Ltd
 Shah Patel & Co
 Wima (India)

BOTTLING SYSTEMS

Bottling Plants

Alfa-Laval (India) Ltd
 Dany Dairy & Food Engineers
 Limited
 Dynatron Pvt Ltd
 Larsen & Toubro Ltd
 M K Industries
 (Late additions)
 M Sant Singh & Sons
 Mohan Machines Ltd
 Monex India Corporation
 Rita Agencies
 Sumitomo Corporation

Conveyors/Sterilisers

Dairy Equipment Company
 Dairy Udyog
 Dany Dairy & Food Engineers
 Limited
 Karthic Enterprises
 Kpsar Engineering Works
 Lucky Steel Industries
 Monex India Corporation
 Panchal Workshop
 Perfect Engineering Works
 RPM Engineers
 Techno-Equipments
 Thakor Dairy Machinery
 Supplies Co

BUTTER-MAKING EQUIPMENTS

Butter Churns/Butter Oil Making Plants

Alfa-Laval (India) Ltd
 Anup Engineering Ltd
 (Late additions)
 Chadha Sales Pvt Ltd
 Dairy Equipment Company
 Dairy Udyog
 Kristam Engineers Pvt Ltd

Larsen & Toubro Ltd
 Ram Kumar & Bros
 Sinhal Metal Industries
 Private Limited
 Stainco Enterprises Pvt Ltd
 Stainless & Steel Products Co
 Unicorn Machinery Manufac-
 turers Limited
 Vishal Equipments

Butter Moulding & Wrapping Machines

Alfa-Laval (India) Ltd
 HMT Limited
 Larsen & Toubro Ltd

Continuous Butter Making Machines

Alfa-Laval (India) Ltd
 HMT Limited
 Larsen & Toubro Ltd

CANS & CAN WASHING SYSTEM

Aluminium Seamless Cans

Agricultural Implements &
 Brass Utensils (Late
 additions)
 Alfa-Laval (India) Ltd
 Anup Engineering Ltd
 (Late additions)
 Dairy Udyog
 Form Technics (India) Pvt Ltd
 Khambete Kothari Cans & Allied
 Products Private Limited
 Lakshmi Milktesting Machinery
 Company
 Rajasthan Cylinders &
 Containers Ltd
 Tamil Nadu Dairy Equipments
 Mfg Indl Coop Soc Ltd

Mild Steel Cans

Dilip C Bhate
 Jemco Industries
 (Late additions)
 Ram G Deo & Sons
 (Late additions)
 Taj Industries

Can Scrubbers/Sterilizers/ Washers

Anand Dairy Machinery Co
 Aro-Grad Engineering
 Dairy Mashkin Fabrik
 Dairy Udyog
 Dany Dairy & Food Engineers

Filtron Engineers Pvt Ltd
 Lucky Steel Industries
 Nichrome Metal Works
 Panchal Workshop
 RPM Engineers
 Somani International Corpn
 Swastik Safe & Iron Works
 Pvt Ltd
 Thakor Dairy Machinery
 Supplies Co
 Unicorn Machinery
 Manufacturers Ltd

CHEESE-MAKING EQUIPMENTS

Cheese Grinders/Press/Vats

APV-Textmaco Ltd
 Alfa-Laval (India) Ltd
 Anup Engineering Ltd
 (Late additions)
 Dairy Mashkin Fabrik
 Dairy Udyog
 F H Design & Process Spec-
 ialities (Late additions)
 Larsen & Toubro Ltd
 Panchal Workshop
 Somani International Corpn
 Stainless & Steel Products Co
 Staybright Equipment Co
 (P) Ltd
 Swastik Safe & Iron Works
 Pvt Ltd
 Thakor Dairy Machinery
 Supplies Co
 Unicorn Machinery
 Manufacturers Ltd
 Vishal Equipments

C.I.P. UNITS

APV-Textmaco Ltd
 Alfa-Laval (India) Ltd
 Indian Dairy Machinery Co
 Larsen & Toubro Ltd
 Process Equipments
 Stainless & Steel Products Co
 Unicorn Machinery
 Manufacturers Ltd
 Vishal Equipments

DAIRY PLANT EQUIPMENTS

Dairy Plants

APV-Textmaco Ltd
 ATE Private Limited
 Alfa-Laval (India) Ltd
 Dany Dairy & Food Engineers
 Limited
 Filtron Engineers Pvt Ltd
 Indian Dairy Machinery Co
 Larsen & Toubro Ltd
 Somani International Corpn
 Unicorn Machinery
 Manufacturers Ltd
 Unitech Machines Ltd

Control Panels/Switchboards

Adcon Electronics Pvt Ltd
 Advance Electronics
 Associated Entrepreneurs &
 Erectors (I) Pvt Ltd
 Crompton Greaves Ltd
 Everlite Industries
 Industrial Controls
 Jyoti Limited
 K V Electrical Engineering Co
 Macbro Engineering Co
 Osaka Electronics Enterprise
 Power & Instrumentation
 Siemens India Ltd
 Switchgears Controls & Systems

Conveyors

Aro-Grad Engineering
 Cremach Designs
 Dairy Mashkin Fabrik
 Dany Dairy & Food Engineers
 Limited
 Jayems Parkim Pvt Ltd
 Kraun Mettalex
 M Sant Singh & Sons
 Mather & Platt (India) Ltd
 Mazda International Pvt Ltd
 Panchal Workshop
 Power Equip
 Process Equipments
 R P M Engineers
 Shrepak Brothers
 Spectoms Engineering Pvt Ltd
 Swastik Safe & Iron Works
 Pvt Ltd

Thakor Dairy Machinery
 Supplies Co
 Unicorn Machinery
 Manufacturers Ltd
 Vishal Equipments
 Wiperdrive Engineering

Cream Separators

Alfa-Laval (India) Ltd
 Bhandari Manufacturing Works
 Chadha Sales Pvt Ltd
 Dairy Appliances Co
 Doshi & Sons
 Gandhi Trading Co
 HMT Limited
 Indian Dairy Equipment Co
 Jinendra Agencies
 Kishor Trading Corporation
 Lakshmi Milktesting Machinery
 Company
 Larsen & Toubro Ltd
 M S Chadha & Sons
 (Late additions)
 Mulakh Raj & Co
 Paras Dairy Appliances
 Singhal Udyog (Regd)
 Sinhal Metal Industries
 Pvt Ltd
 Somani International Corpn
 Star Freeze Industries
 Universal Dairy

Filling Machines

K I A & Co (Late additions)
 Mather & Platt (India) Ltd
 Nichrome Metal Works
 Panchal Workshop
 Samarpan Fabricators Ltd

Heat Exchangers

APV-Textmaco Ltd
 Air Flow Pvt Ltd
 Alfa-Laval (India) Ltd
 Bharat Heavy Plate & Vessels
 Limited
 Bharat Process & Mechanical
 Engineers Ltd
 Dany Dairy & Food Engineers
 Limited
 Filtron Engineers Pvt Ltd
 HMT Limited

Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
Lata Iron & Steel Works
National Refrigeration Works
Rajan Steel Fabricators
Somani International Corpn
Snowtemp Engineering Co Ltd
Standard Fabricators (India)
Pvt Ltd
Texmaco Ltd
Unitech Machines Ltd

Homogenisers

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
Dairy Mashkin Fabrik
Dany Dairy & Food Engineers
Limited
HMT Limited
J S Engineering Works
Larsen & Toubro Ltd
Pasteur Engineering Co(P)Ltd
Sigma Sales Service
Somani International Corpn
Stormac India Ltd

Industrial Fans & Blowers

Hi-Speed Turbodrives
Unique Aerovent Pvt Ltd
Ventura Fabrication Pvt Ltd

Insects Control Systems

Pecopp Products
(Late additions)
Pest Control (I) Pvt Ltd

Pasteurizers

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
Dany Dairy & Food Engineers
Limited
Filtron Engineers Pvt Ltd
HMT Limited
Indian Dairy Machinery Co
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
M Sant Singh & Sons (Regd)
Milko Industries
Olympus Refrigeration &
Engineering Corporation
Process Equipments
Shriram Temp-X-Changers
Sigma Sales Service
Somani International Corpn
Stormac India Ltd
Unitech Engineers Pvt Ltd
Unitech Machines Ltd

Pipes

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
Continental Enterprises
D G S Company
Dayry Engineering Services
Pvt Ltd
Hemkunt Industrial Corporation
Indian Dairy Machinery Co
Industrial Aiders
Industrial Engineers
J N Marshall Pvt Ltd
Jindal Group
Kpsar Engineering Works
Kristam Engineers Pvt Ltd
M Sant Singh & Sons (Regd)
Metal India
Modern Industrial Corporation
Monex India Corporation
Mum Engineering Co
Neeka Tubes Limited
RPM Engineers
Ratnamani Metals & Tubes
Pvt Ltd
Unicorn Machinery
Manufacturers Ltd
Vijay Steel Industries
(Late additions)

Pressure Vessels

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
Bharat Heavy Plate & Vessels
Ltd
Energy Machine
F H Design & Process Spec-
ialities (Late additions)
Indra Fabricators
Larsen & Toubro Ltd
Olympus Refrigeration &
Engineering Corporation
Poly Plast
Rajan Steel Fabricators
Snowtemp Engineering Co Ltd
Texmaco Ltd
Unicorn Machinery
Manufacturers Ltd
Warm Stream
Westerwork Engineers Ltd

Process Pumps (ss)

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
Dairy Mashkin Fabrik
Dany Dairy & Food Engineers
Limited
Dayry Engg Services Pvt Ltd

Filtron Engineers Pvt Ltd
Fristam Pumps (India) Pvt Ltd
Greaves Cotton & Co Ltd
HMT Limited
Industrial Engineers
Ingersoll-Rand (India) Ltd
Kpsar Engineering Works
Roto Pumps & Hydraulics
Private Limited
Somani International Corpn
Stainless & Steel Products Co
Standard Fabricators (India)
Pvt Ltd
Stormac India Ltd
Unicorn Machinery
Manufacturers Ltd

Solar Systems

Industrial Aiders
Jyoti Limited
Rajasthan Electronics &
Electricals Limited
Warm Stream

Temperature Controllers

Bestobell India Ltd
Greaves Cotton & Co Ltd
J N Marshall Pvt Ltd
Taylor Instruments Co(I)Ltd

Thermic Fluid Heaters

Energy Machine
Stainco Enterprises Pvt Ltd
Thermax Pvt Ltd
Warm Stream
Westerwork Engineers Ltd

Miscellaneous Equipment

Anik Dairy Equipments
Chadha Electro Industries
(Late additions)
Continental Enterprises
D G S Company
Emmes Metal Pvt Ltd
Heatly & Gresham (I) Ltd
Hemkunt Industrial Corpn
Indian Dairy Machinery Co
M M Traders
P J Suratia & Co
Paras Dairy Appliances
Process Machinery &
Equipment Pvt Ltd
Shriram Temp-X-Changers (I)
Structures & Vessels
Swastik Safe & Iron Works
Pvt Ltd
Vishal Equipments

EFFLUENT TREATMENT PLANTS

Batliboi & Co Ltd
Garware Beverages
Geo Miller & Co (Pvt) Ltd
Hydraulic & General
Engineering Ltd
Picdan Heavy Equipment Ltd

GHEE-MAKING PLANTSGhee Boilers/Settling Tanks

APV-Textmaco Ltd
Alfa-Laval (India) Ltd
Anup Engineering Ltd
(Late additions)
Bantia Steel Industries P Ltd
Dany Dairy & Food Engineers
Limited
F H Design & Process Spec-
ialities (Late additions)
Filtron Engineers Pvt Ltd
Foremost Engineers (P) Ltd
(Late additions)
Goodwell Industries
Industrial Aiders
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
M Sant Singh & Sons (Regd)
Mann Dairy & Food Services
Prabsons
RPM Engineers
Shriram Temp-X-Changers (I)
Stainco Enterprises Pvt Ltd
Unicorn Machinery
Manufacturers Ltd
Unitech Engineers Pvt Ltd
Unitech Machines Ltd
Vishal Equipments

Ghee Packing Machines

Nichrome Metal Works
Panchal Workshop
Samarpan Fabricators Limited

ICE CREAM UNITSIce-Cream Plants

APV-Textmaco Ltd
Alfa-Laval (India) Ltd
Capital Projects &
Engineering

Daffoo Industries
Dairy Den (India) Pvt Ltd
Dany Dairy & Food Engineers
Limited
HMT Limited
Hindustan Refrigeration Stores
J S Engineering Works
Larsen & Toubro Ltd
Olympus Refrigeration &
Engineering Corporation
RPM Engineers
Sigma Sales Service
Somani International Corpn
Universal Commercial Corpn
Vishal Equipments

Ice-Cream Cabinets

Chandra Industries
Ghanshyam Ice-Box
Manufacturers
Hindustan Refrigeration Stores
Lowtemp Equipment Co
Richardson & Cruddas(1972)Ltd
Sigma Sales Service

Ice-Cream Moulds

Nyform

Push Carts

Ghanshyam Ice Box
Manufacturers
Verdi Rehri Stores

Softy Machines

Dairy Den (India) Pvt Ltd
Hindustan Refrigeration Stores
Sigma Sales Service
Somani International Corpn

MATERIAL HANDLING EQUIPMENTS

Power Equip
Power Mech
Standard Fabricators (India)
Pvt Ltd
Westerwork Engineers Ltd

MILK POWDER PLANTSDryers (Roller/Spray)

Alfa-Laval (India) Ltd
Dany Dairy & Food Engineers
Limited
Energy Machine

Filtron Engineers Pvt Ltd
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
Lata Iron & Steel Works
Pasteur Engineering Co(P)Ltd
Stainco Enterprises Pvt Ltd
Stainless & Steel Products Co
Unitech Machines Ltd
Warm Stream
Wiegand India Pvt Ltd

Evaporators

APV-Textmaco Ltd
Alfa-Laval (India) Ltd
Dany Dairy & Food Engineers
Limited
Filtron Engineers Pvt Ltd
Larsen & Toubro Ltd
Lata Iron & Steel Works
Stainless & Steel Products Co
Standard Fabricators (India)
Pvt Ltd
Unicorn Machinery
Manufacturers Ltd
Unitech Machines Ltd
Wiegand India Pvt Ltd

PACKAGING MACHINESAseptic Packaging Machines

Alfa-Laval (India) Ltd
Food & Pharma Specialities
Hindustan Packaging Co Ltd
Larsen & Toubro Ltd
Mather & Platt (India) Ltd
Somani International Corpn

Embossing Machines

Lucky Steel Industries
Panchal Workshop

Form Fill Seal Machines (FFS)

Dr Froeb KG
Exxon Packing Systems Pvt Ltd
K I A & Co (Late additions)
Nichrome Metal Works
Samarpan Fabricators Limited
Somani International Corpn
Vijaipac Enterprises

Hi-Speed Packaging Machinery

Alfa-Laval (India) Ltd
Nichrome Metal Works
Panchal Workshop

Reed Medway Packaging Co of
India Private Limited
Samarpan Fabricators Limited
Stitchwell Qualitex
Tyco (India) Pvt Ltd
(Late additions)

Sealing Machine

Eee Cee & Co (Late additions)
Select Packaging Machinery
(Late additions)

Seaming Machine

Metal Box India Ltd
Practical Electronics Corpn
Reed Medway Packaging Co of
India Private Limited
Somani International Corpn
Stitchwell Qualitex

Shrink Wrap Machine

Malhati Tea & Industries Ltd
Perks Engineering
Select Packaging Machinery
(Late additions)

Thermofforming Machine

Select Packaging Machinery
(Late additions)

Vacuum Packaging Machine

Anandlok International
(Late additions)
Bhagwati Supervac Pvt Ltd
(Late additions)
Dr Froeb KG
Perks Engineering

General

AR Packaging Systems Ltd
(Late additions)
Ajay & Abhay (P) Ltd
Anandlok International
(Late additions)
Bakubhai Ambalal Pvt Ltd
Bhagwati Supervac Pvt Ltd
(Late additions)
Dairy Trading Corporation
Exxon Packing Systems Pvt Ltd
Food & Pharma Specialities
Gami Engineers
Gimret & Co
Indo-Europa Trading Co
Pvt Ltd
Metal Box India Ltd
Modesto Packagings Pvt Ltd
Nichrome Metal Works

Processquip Projects Pvt Ltd
(Late additions)
Rollatainers Ltd
Salesworth India Pvt Ltd
Samarpan Fabricators Limited
Select Packaging Machinery
(Late additions)
Somani International Corpn
Sved Engineers (P) Ltd
Visco Enterprise

REFRIGERATION PLANTS/EQUIPMENT

Chilling/Refrigeration Plants

APV-Texmaco Ltd
ATV Projects (India) Ltd
(Late additions)
Alfa-Laval (India) Ltd
American Refrigeration Co Ltd
Batliboi & Co Ltd
Blue Star Ltd
C Doctor & Co (P) Ltd
Capital Projects & Engineering
Dany Dairy & Food Engineers
Limited
Economy Refrigeration Pvt Ltd
Etscheid India Pvt Ltd
Filtron Engineers Pvt Ltd
Frick India Limited
Frigsales (I) Pvt Ltd
HMT Limited
Indian Dairy Machinery Co
Industrial Fabricators
Kirloskar Pneumatic Co Ltd
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
Milko Industries
Mohan Machines Ltd
Monex India Corporation
National Heavy Engineering
Coop Ltd
National Refrigeration Works
Olympus Refrigeration &
Engineering Corporation
Process Equipments
Richardson & Cruddas(1972)Ltd
Saraba Metal Works
Sigma Sales Service
Snowtemp Engineering Co Ltd
Somani International Corpn
Stainless & Steel Products Co
Stormac India Ltd
Supreme Industrial Works
Thermoair Corporation
Unicorn Machinery Mfrs Ltd

Unitech Engineers Pvt Ltd
Unitech Machines Ltd
Utility Engineers (India)Ltd
Vaccuflow Industries
Vishal Equipments
Voltas Ltd

Blast Freezers

Capital Projects & Engineering
Somani International Corpn

Compressors

Alfa-Laval (India) Ltd
Freeze King Industries(P)Ltd
Frick India Limited
Ingersoll-Rand (India) Ltd
Kirloskar Pneumatic Co Ltd
Lalsons & Co(Late additions)
National Refrigeration Works
Snowtemp Engineering Co Ltd
Somani International Corpn
Star Freeze Industries
Sunder Singh & Co Pvt Ltd
Utility Engineers (I) Ltd
Voltas Ltd

Cooling Towers

Batliboi & Co Ltd
Kirloskar Pneumatic Co Ltd
Olympus Refrigeration &
Engineering Corporation
Paharpur Cooling Towers
Private Limited

Deep Freezers

APV-Texmaco Ltd
Alfa-Laval (India) Ltd
American Refrigeration Co Ltd
Blue Star Ltd
Capital Projects & Engineering
Chandra Industries
Dairy Udyog
Economy Refrigeration Pvt Ltd
Etscheid India Pvt Ltd
Freeze King Industries (P)Ltd
Frick India Limited
Frigsales (I) Pvt Ltd
Multifrig Marketing Co (P) Ltd
National Refrigeration Works
Olympus Refrigeration &
Engineering Corporation
Richardson & Cruddas(1972)Ltd
Sigma Sales Service
Snowtemp Engineering Co Ltd
Somani International Corpn
Star Freeze Industries
Thermoair Corporation

Utility Engineers (I) Ltd
Voltas Limited

TANKS

Milk Storage Tanks

APV-Textmaco Ltd
ATV Projects (I) Ltd
(Late additions)
Alfa-Laval (India) Ltd
Alin Enterprises
Anand Dairy Machinery Co
Bantia Steel Industries
Pvt Ltd
Bharat Heavy Plate &
Vessels Ltd
Capital Projects &
Engineering
Dairy Udyog
Dany Dairy & Food Engineers
Limited
Filtron Engineers Pvt Ltd
Foremost Engineers (P) Ltd
(Late additions)
Gardeners Corporation
Indian Dairy Machinery Co
Industrial Aiders
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
Lloyds Steel Industries
Pvt Ltd
M Sant Singh & Sons (Regd)
Mann Dairy Food Services
Milko Industries
Monex India Corporation
Olympus Refrigeration &
Engineering Corpn
Poly Plast
Prabsons
Process Equipments
R P M Engineers
Richardson & Cruddas(1972)Ltd
Saptagiri Engineers
Saraba Metal Works
Seven Hills Industries
Sigma Sales Service
Sila Industries
Sri Venkateswara Industries
Stainco Enterprises Pvt Ltd
Stainless & Steel Products Co
Staybright Equipment Co
(P) Ltd
Stormac India Ltd
Techno-Equipments
(Late additions)
Unicorn Machinery Manufac-
turers Ltd

Unitech Engineers Pvt Ltd
Unitech Machines Ltd
Vishal Equipments

Silos

Alfa-Laval (India) Ltd
Alin Enterprises
Dany Dairy & Food Engineers
Limited
Elmet Industries
Filtron Engineers Pvt Ltd
G R Engineering Works Pvt Ltd
Indian Dairy Machinery Co
Larsen & Toubro Ltd
Lloyds Steel Industries
Pvt Ltd
Mann Dairy & Food Services
Mohan Machines Ltd
Monex India Corporation
Prabsons
Process Equipments
Seven Hills Industries
Spectoms Engineering Pvt Ltd
Stainless & Steel Products Co
Unicorn Machinery Manufac-
turers Ltd
Unitech Engineers Pvt Ltd
Unitech Machines Ltd
Vishal Equipments

Tankers (Road/Rail)

Alfa-Laval (India) Ltd
Ashok Leyland Ltd
Bharat Earth Movers Ltd
Burn Standard Co Ltd
Cimmco International (Under-
frames for rail milk
tankers)
Dany Dairy & Food Engineers
Limited
Elmet Industries
Filtron Engineers Pvt Ltd
Foremost Engineers (P) Ltd
(Late additions)
Hind Tank Manufacturing Co
Indian Dairy Machinery Co
Industrial Aiders
Jay Coach Builders Pvt Ltd
Kristam Engineers Pvt Ltd
Larsen & Toubro Ltd
Lata Iron & Steel Works
Lloyds Steel Industries
Pvt Ltd
Mann Dairy & Food Services
Mohan Machines Ltd
Monex India Corporation
Prabsons
Process Equipments

Richardson & Cruddas(1972)Ltd
Ruby Coach Builders Pvt Ltd
Saptagiri Engineers
Seven Hills Industries
Sri Venkateswara Industries
Stainless & Steel Products Co
Stormac India Ltd
Sundaram Industries Ltd
Tata Engineering & Loco-
motive Co Ltd
Textmaco Ltd
Unicorn Machinery Manufac-
turers Ltd
Unitech Engineers Pvt Ltd
Unitech Machines Ltd
Vishal Equipments

UHT PLANTS

APV-Textmaco Ltd
ATE Private Limited
Alfa-Laval (India) Ltd
Larsen & Toubro Ltd
Somani International Corpn
Stormac India Limited

WATER TREATMENT PLANTS

A-1 Industries
Bharat Process & Mechanical
Engineers Ltd
Garware Beverages
Permionics
Thermax Pvt Ltd

WEIGHING EQUIPMENT

Arkay Engineering Enterprise
Avery India Ltd
Bantia Steel Industries
Pvt Ltd
Dairy Udyog
Mazda International Pvt Ltd
Narne Tulaman Mfrs Pvt Ltd
Precision Equipment Co
Regal Scale Industries

MISCELLANEOUS

Analytical/Laboratory Eqpt

C Z Instruments Pvt Ltd
D Parikh Engineering Works
Doshi & Sons
Foss Electric India
Indian Equipment Corporation
Lakshmi Milktesting
Machinery Co

M C Dalal & Co
 M M Traders
 Scientific Equipment Works
 Suvik Electronics Pvt Ltd
 Taylor Instrument Co (India)
 Limited
 Tropical Refrigeration Indus-
 tries (Late additions)
 Vinay Trading Co

Corrugated Board & Box Manu-
 facturing Machines

Micro Mechanical Works

Electrical Work Specialists

Associated Entrepreneurs &
 Erectors (India) Pvt Ltd

FRP Insulated Milk Vending
 Units

Gandhi & Associates
 Polyglass Fibre Industries
 Roplas (India) Ltd
 Sila Industries
 Singlass Fibre Ltd
 Sri Venkateshwara Industries

Fodder Production Unit

Fometa India Machines Pvt Ltd

Generator Sets

Adcon Electronics Pvt Ltd
 Batliboi & Company Ltd
 Ghate Power Installation
 Greaves Cotton & Co Ltd
 Jyoti Limited
 Kirloskar Electrodyne Pvt Ltd
 Powerica Sales & Services
 (P) Ltd
 Shah & Co Associates
 Voltas Ltd

Polythene Film Plants

Bimag Machines Pvt Ltd
 Brimco Plastic Machinery
 Pvt Ltd
 Kolsite Industries

Thermometers

Kumar Industries

Urea-Mollases Animal Lick
 Plant

Aro-Grad Engineering
 Cremach Designs

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Contact:

{Sales & Service:

**Govt Dairy Rd,
 MIRAJ.**

PHONE: 2195

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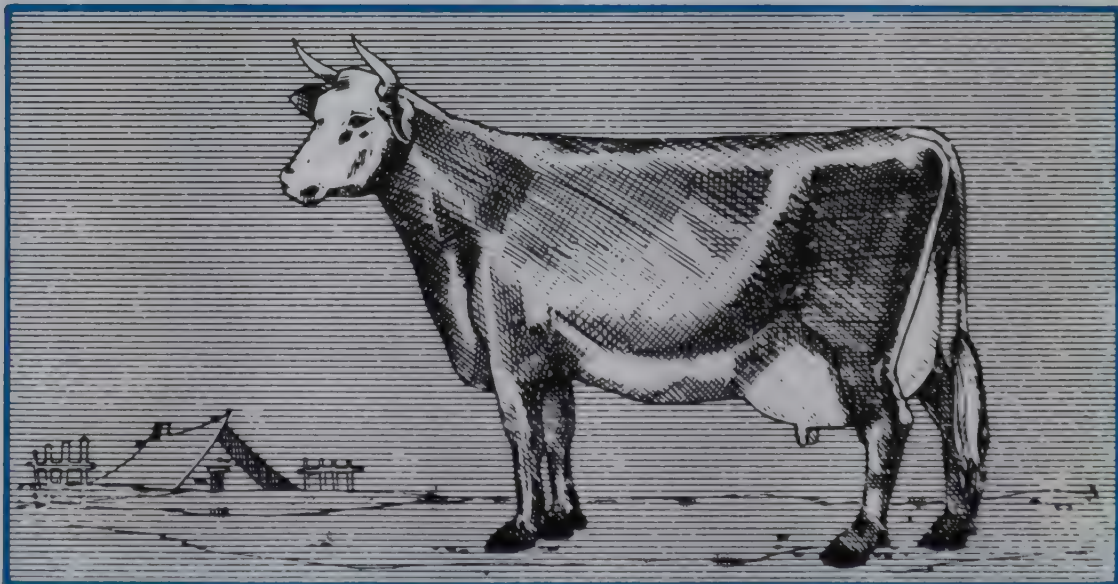
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- ☐ LAYMORE ☐ SUPER BROILER FEEDS

CATTLE FEEDS:

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LAXMI FEEDS & EXPORTS PVT. LTD.

HEAD OFFICE: Tanna House Annexe, 11-A, N.D. Parekh Marg.
Bombay 400 039. Tel. 2021165 & 2020045 Gram: LAXMIFEEDS

BRANCH OFFICES • M.S. Ramaiah Indl. Estate, Gokula, Bangalore 560 054. Tel: 360188 & 363341

Feed Manufacturers

Listed below alphabetically are feed manufacturers, which also includes manufacturers and suppliers of feed ingredients. Manufacturers of feed additives and mineral mixtures are listed under Pharmaceuticals. Suppliers of fodder seeds and fodder seed farms are listed separately.

A V M CATTLE & POULTRY FEEDS MANUFACTURING INDUSTRIES, 25/689 Rangai Gowder St, Coimbatore 641001, Tamil Nadu; Ph: 23683, factory: 26933, Gram: Cattlefood, Tlx: 855-320 AVM IN; Mg Dir: A M A Wahab, Ph off: 26943, resi: 24460. Brand Name: AVM.

ADONI PROTEIN FOODS, Madhavaram Rd, PB No 28, Adoni 518301, AP; Ph: 2600, factory: 2383, Gram: Expellers; Business Exec: T G Raghavendra, Ph resi: 2677. Brand Name: TGL.

AGARWAL UDYOG, 522-525 Lahori Gate, Naya Bazar, Delhi 110006; Ph: 233134, 235029; Partner: J N Agarwal, Ph resi: 2544 (Hapur).

AGRO THERM PVT LTD, 282, 7th Cross, Gokulam 3rd Stage, Mysore 570002; Ph: 21230, 27547, Gram: Sififeeds; Exec Dir: V Eapen, Ph resi: 21277. Associate Co: Southern India Food Industries, 56/1 Nachanahalli Palya, Mananthavady Rd, Mysore 570008. Brand Name: SIFI.

AMAR AGENCIES, 119/530-A Darshanpurwa, Kanpur 208012; Ph: 21880, 21926, Gram: Vetfeed; Mg Partner: H S Kalra. Brand Name: Super.

ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, THE, Administrative Bldgs, Lalapet, Hyderabad 500017; Ph: 71851 to 71859, Gram: Apdairy, Tlx: 0425-545; Mg Dir: K Sadasiva Rao, IPS. Feed Mixing Units: Amudalavasa, Srikakulam Dist; Bhongir, Nalgonda Dist; Buddhavaram, Krishna Dist; Godwal, Mahboobnagar Dist; Gudlavalleru, Krishna Dist; Karimnagar, Karimnagar Dist.

ANIMAL FEEDS DAIRIES & CHEMICALS PVT LTD, Jharapada, Bhubaneswar 751006; Ph: 53246, 54103, Gram: Chakra; Mg Dir: Ranjit K Roy; Exec Dir: S S Das.

AURORA FEED MILLS, Factory Area, Patiala 147001; Ph: 76952, Gram: Auroramill; Mg Partner: Jaswant Singh, Ph resi: 77961. Brand Name: Sona.



BALLYGUNGE FODDER MILLS (FEED DIV), 9 Gurusaday Rd, Calcutta 700019; Ph: 431680, 444905, resi: 447687, Gram: Chunidana; Partners: U C Prasad, T Prasad, R Prasad; Tech Adviser: Dr R Som. Brand Name: Maharaja.

BANASKANTHA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, PB No 20, Palanpur 385001; Ph: 2259, 2621, 2622, Gram: Banasdairy, Tlx: 0121-289; Mg Dir: R Saini, Ph resi: 2322; Incharge, Cattle Feed Plant: B G Oza. Brand Name: Banasdan.

BARODA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Baroda Dairy, Baroda 390009; Ph: 555066, 555220, Gram: Barodairy, Tlx: 0175-294; Mg Dir: Hemendra R Dholakia. Factory: Itola, Dist Baroda. Brand Name: Baroda Dan.



BHANDARI CROSSFIELDS LTD, Bombay-Agra Rd, Mangliagaon 453771, Indore Dist, MP; PB No 143, Indore 452001; Ph: 39382, 30569, Gram: Feed, Tlx: 0735-251; Mg Dir: R S Bhandari, Ph: 36667, resi: 5571; Chief Exec: Dilip R Bhandari. Brand Names: Nand, Gopal, Shyam, Royal, Five Star.

BHARUCH DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Dudh Dhara Dairy, PB No 29, National Highway No 8, Bholav, Bharuch 392002; Ph: 2048, 2054, Gram: Dudhara;

See also LATE ADDITIONS at the end of the listing



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Gen Mgr: R S Patel.

BHASKAR BIO-INDUSTRIES, Siddheshwar Mahal, Station Rd, Hubli 580020, Karnataka; Ph: 6075, Gram: Feedking; Mg Partner: Sanjay Dronawat, Ph resi: 2412.

BRAMHAPPA TAVANAPPANAVAR PVT LTD, Krishna Raja Rd, Manidipet, PB No 7, Davangere 577001, Karnataka; Ph: 3014, Gram: Bramhappa, Tlx: 844-216; Mg Partners: T Nabhiraj, T Subharao. Brand Name: BT.

BRIDHICHAND CHIRANJILAL, PO Jugsalai, Jamshedpur 831006; Ph off: 23216, Mill: 25457, Gram: Shiwratanco (Tatanagar); Prop: Shivratan Bhauka. Brand Name: Shankar.

CHIRANJILAL AGARWAL, "Everest", 46-C Chowringhee Rd, Calcutta 700016; Ph: 445106; Chief Exec: Sohanlal Agarwal. Brand Name: Sona.

COIMBATORE CHEMICALS & FERTILISERS PRIVATE LTD, 11/1 Chettipalayam Rd, Podanur, Coimbatore 641023; Ph: 25355, Gram: Fatmilk; Mg Dir: N Rajagopalaswamy Naidu; Jt Mg Dirs: R Natarajan, R Ravichandran. Brand Name: Maruti.

DEEPAK CATTLEFEED FACTORY, Station Rd, Harij 384240, Dist Mehsana; Ph: 217; Mg Partner: G P Thakker; Mgr: S P Thakker, Ph resi: 133. Brand Name: Deepak.

DELUX FEED PRODUCTS PVT LTD, 46 Eastern Chambers, Poona St, Bombay 400009; Ph: 866653, 864489; Mg Dir: V P Chibber. Branches — Assam: Ulu Bari, Guwahati 781007; Ph: 5877; Gujarat: Sardar Market, Poona Kumaria Bldg, Surat 395001; Ph: 24640.

DHANPAT MAL JAWALA DASS FEED MILLS (Prop: Nandi Provender Mills), 33 Shivaji Marg, New Delhi 110015; Ph: 531077, Gram: Jawalabhog; Mg Partner: Vineet Virmani, Ph off: 531372, resi: 619209.

DIMPLE FEEDS, Near Veterinary Hospital, Rajpura 140401; Ph: 2433; Prop: Dr Rajesh Khanna

DOUBLE ONE TRADERS & MANUFACTURERS, 120 Industrial Estate, Zainakot, Srinagar 190012; Ph: 73406, Gram: Double One; Prop: M A Sidiqi, Ph resi: 73406. Branch: Sidiqi Manzil, Karan Nagar, Srinagar 190010. Brand Name: Double One.

DWARKA CATTLE FEED, PB No 17, Akola Bazar, Khamgaon 444303, Maharashtra; Ph: 93, Gram: Bhawani; Chief Execs: Dinesh H Agrawal, H H Agrawal.

E I D - PARRY (INDIA) LTD, Agro Inputs/Feeds Div, "Parry House", PB No 12, Madras 600001; Ph: 29251, Gram: Distimulo, Tlx: 315; Mgr: A G Kripal Singh; Dep Mgr: P Doraiswamy; Sr Asst Mgrs:

S Ananthanarayanan, Dr M R Prabakar.

Regional Offices — Andhra Pradesh:

Agro Inputs Controlling Off: PB No 1553, 66 Rashtrapathi Rd, Secunderabad 500003; Ph: 70245; Cuddapah, Guntur, Kakinada, Kurnool, Tadepalligudem, Vijayawada, Visakhapatnam, Warangal; Karnataka: Bangalore, Belgaum, Bellary, Mysore; Kerala: Kottayam; Madhya Pradesh: Bhopal; Orissa: Bhubaneswar; Tamil Nadu: Cuddalore, Erode, Madras, Madurai, Ootacamund, Trichy; West Bengal: Calcutta. Brand Name: Parry's.

ESSEN ENTERPRISES, Peddibhotlavari St, Governorpet, Vijayawada 520002; Ph: 63201, Gram: Essenfeeds; Prop: P Satyanarayana, Ph resi: 74110. Brand Name: Essen.

ESSEN FEEDS, Plot No 3, 1st Cross Rd, Auto Nagar, Vijayawada 520007; Ph fact: 52814, off: 63201, resi: 74110, Gram: Essenfeeds; Mg Partner: T Nageswara Rao. Brand Name: Essen.

FEED FORTIFIERS, F-52, Panki Site-2, Udyog Nagar, Kanpur 208022; Ph: 216445, Gram: Feedfort; Prop: Dr A Tripathi; Nutritionist: Mrs K Tripathi; Mgr: K S Singh. Brand Name: Kamdhenu Super.

FEEDS INDIA, A-1 SIDCO Industrial Estate, PB No 9, Namakkal 637012, Tamil Nadu; Ph: 2330; Mg Partner: M K Ponnusamy.

FOODS FATS & FERTILISERS LIMITED, Fountain Plaza, 7th Floor, Pantheon Rd, Egmore, PB No 759, Madras 600008; Ph: 82121 (5 lines), Gram: Foodfert, Tlx: 041-509 FFF IN; Dirs: B K Goenka, S B Goenka, G S Goenka. Factory: Tanuku Rd, PB No 15, Tadepalligudem, West Godavari Dist. Branches: Bombay, Calcutta, Hyderabad, Kakinada. Brand Name: Pushti.

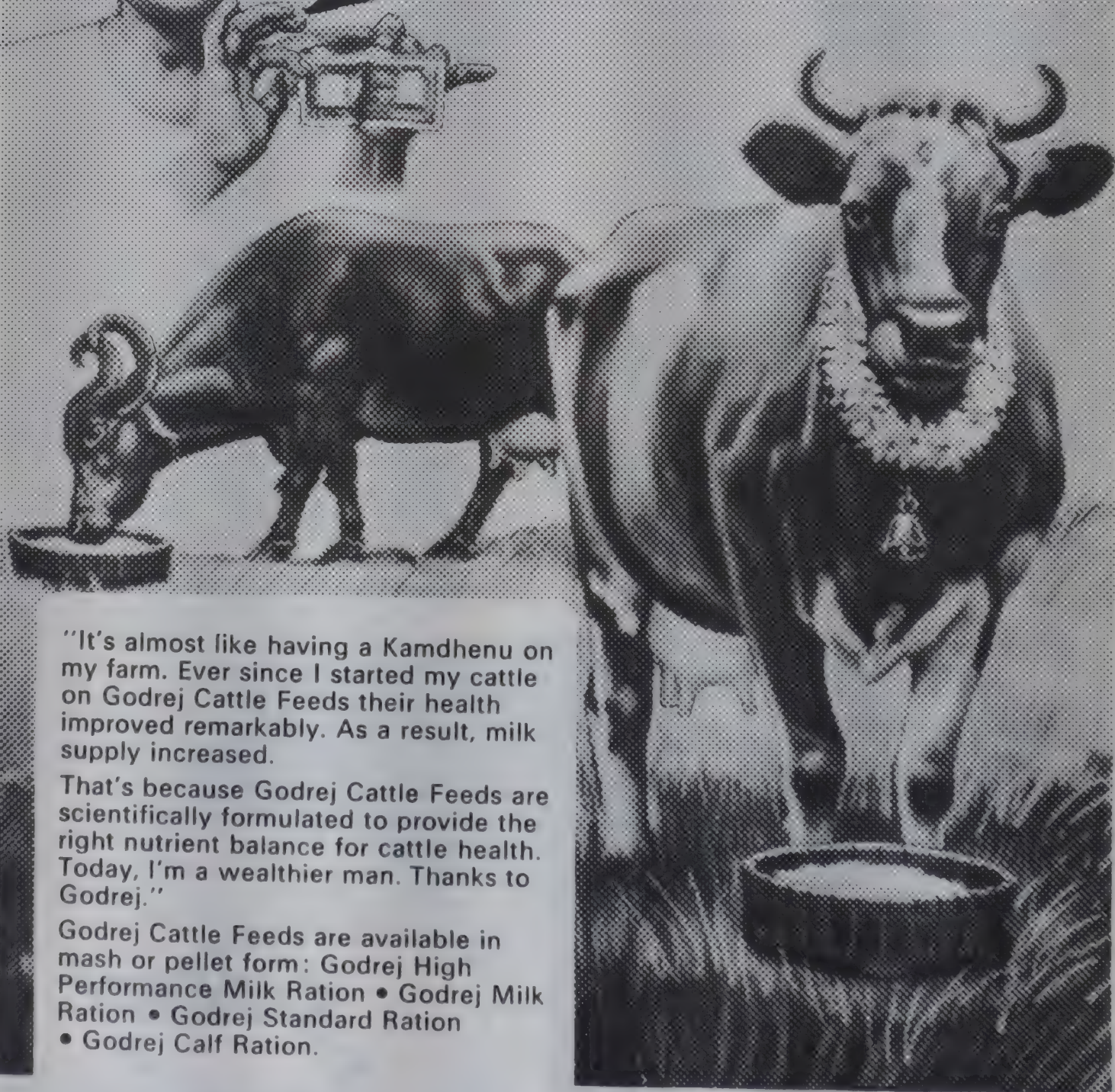
GANESH PROVINDER MILLS (Prop: S P Virmani & Son (P) Ltd), PO Jawala Flour Mills, Haripura, Amritsar 143001; Ph: 42653, 43141, Gram: Dhanpat; Jt Mg Dir: Vineet Virmani. Brand Name: Nandi.

Godrej

GODREJ SOAPS PVT LTD, Animal Feeds Div, Pirojshanagar, Eastern Express Highway, Vikhroli, Bombay 400079; Ph: 584461-69, Gram: Soapgodrej, Tlx: 011-71480; Mg Dir: Dr B P Godrej; Dir: N B Godrej; Vice-Pres (AF Mktg): Dr S L Anaokar; Dep Mktg Mgr: J Y Gupte; Nutritionist: Dr G F



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Mithuji. Branches — **Calcutta:** Chatterjee International Centre, 33A Chowringhee Rd, 16th Floor, -700071; Ph: 248482, 248480, 248176, Gram: Soapgodrej, Tlx: 021-7779; Sales Mgr (East): K H Javeri; **Khanna:** C-41-46 Focal Point, Khanna, Dist Ludhiana; Ph: 3292, 3272; Mktg & Nutrition Exec: R S Vijan; **Madras:** Plot No 1-B, Industrial Estate, Ambattur, -600098; Ph: 632047, Gram: Feedgodrej, Tlx: 041-7438; Factory Mgr: A Rangarajan; Branch Mgr (AF South): Dr E N Rao; **Miraj:** Plot No B-2, MIDC Industrial Area, -416410; Ph: 2874, Gram: Soapgodrej, Tlx: 0193-203; Factory Mgr: C K Vaidya; **New Delhi:** Laxmi Insurance Bldg, Asaf Ali Rd, -110002; Ph: 273775, 267465, Gram: Soapgodrej, Tlx: 031-3148; Sales Mgr (North): H K Press; **Sachin:** Plot No 247/1 GIDC Industrial Estate, -394230; Factory Mgr: H N Patel; **Tirumelveli:** 8 Sivalaperi Rd, Palayamkottai, -627002; Ph: 2346; Factory Mgr: K S Narayanan. **Brand Name:** Godrej.

GOVERNMENT OF ARUNACHAL PRADESH, Directorate of AH & Vet Services — **Feed Mixing Plant,** Composite Livestock Farm, Nirjuli, Naharlagun 791110; Vet Asst Surgeon: Dr J P Bora.

GOVERNMENT OF MEGHALAYA, Directorate of AH & Vet Services — **Zonal Feed Mills** —

East Garo Hills: Tura; **East Khasi Hills:** Bhoi, PO Nayabunglow; **Kyrdemkulai:** Regl Poul Breeding Farm.

GOVERNMENT OF NAGALAND, Directorate of AH & Vet — **Feed Compounding Centre,** Dima-pur; Offr Incharge: Dr K A Wahid; **Feed Mixing Plant,** Mokokchung; Offr Incharge: Dr T Tajen.

GOVERNMENT OF ORISSA, Directorate of AH, Dairy & Vet Services — **Feed Mixing Units** — **Angul:** Dr B Sahu; **Bhajanagar:** Dr B B Raju; **Koraput:** Remuna; Dr P Parida; **Sundergarh:** Dr B Das.

GOVERNMENT OF WEST BENGAL, Directorate of AH — **Feed Mixing Unit,** Haringhatta Farm, PO Mohanpur, Dist Nadia; Ph: 430, 432, 623 (Kalyani).

GUJARAT DAIRY DEVELOPMENT CORPORATION LTD, Sector 16, Gandhinagar 382016; Ph: 2082, 2881, 2883, Gram: Dairycorp; Mg Dir: C R Biswas, IAS. **Factories** — **Ahmedabad:** Cattle Feed Factory, Sarkhej; **Rajkot:** (i) Cattle Feed Factory, Lodhwad Chowk, Gondal Rd, -360002; Ph: 26694, Gram: Dairycorp; (ii) Khandheri (W Rly), PO Anandpur (Morvi), Dist Rajkot; Ph: 22064; Jt Gen Mgr (Mktg): G R Ralhan. **Brand Name:** Rajdan.

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GULRI FEED SUPPLIERS, 4 Malviya Rd, Laxman Chowk, Dehra Dun 248001; Ph: 25907; Mg Partner: R P S Gulri. Brand Name: Golden.

GUNTUR DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Sangam Dairy, Vadlamudi 522213, AP; Ph: 3711 to 3715, Gram: Sangamilk, Tlx: 471-279; Gen Mgr: Dr T Krishna Murthy.

HARYANA AGRO CATTLE FEED PLANT (A unit of The Haryana Agro-Industries Corpn Ltd), Near Railway Junction, Jind 126102; Ph: 2259, Gram: Haramrit; Dep Gen Mgr: S N Tyagi, Ph resi: 2466; Asst Engineer (Purchase): J K Jain; Asst Engineer: J K Verma; Sales Offr: J P Goel. Brand Name: Haramrit.

HARYANA STATE COOPERATIVE SUPPLY & MARKETING FEDERATION LTD, THE, SCO 19, Sector 7-C, Madhya Marg, Chandigarh 160019; Ph: 21731-34, Gram: Hafed, Tlx: 274; Mg Dir: Sunil Ahuja, IAS, Ph: 26697; Gen Mgr: R L Sethi; Quality Control & Nutrition: B S Chaudhury. Cattle Feed Plant: Near Sukhpura, Rohtak; Ph: 4709, Gram: Pashuchara. Brand Name: Hafed.

HIMACHAL PRADESH AGRO-INDUSTRIES CORPORATION LIMITED (A Govt Undertaking), Salig Ram Bhavan, Khalini, Shimla 171002; Ph: 2663, 3621, 5937, Gram: Himagro; Mg Dir:

P S Negi, IAS; Exec Offr: H S Jishtu. Feed Plants: (i) Himagro Cattle & Poultry Feed Plant, Parwanoo 173220, Dist Solan; Ph: 219; Production Mgr: Dr T K Ghosh; (ii) Himagro Cattle & Poultry Feed Plant, Jachh, PO Jassur, Dist Kangra; Ph: 121 (Nurpur); Production Mgr: Dr K C Sood. Brand Name: Himagro Feeds.

HIMALAYAN COOPERATIVE MILK PRODUCERS' UNION LTD, THE, PO Matigara 734428, Dist Darjeeling; Ph: 22553, Gram: Multidairy; Chief Exec Offr: R Mutsuddi. Feed Plant: Himul Cattle Feed Plant, Mallaguri, PO Prodhannagar, Siliguri 734403, Dist Darjeeling; Asst Mktg Offr: P K Maity; Anim Nutrition Offr: Dr B R Basak. Brand Name: Himuldana

HULKOTI COOPERATIVE CATTLE FEED PROCESSING SOCIETY LIMITED, Hulkoti, Dharwar Dist, Karnataka; Ph: 284 (Gadag); Mktg Offr: R H Gaddigoudar. Regional Offices -- Hubli: Anchatageri Lane; M R Kulkarni; Madgao-Goa: 3 Gomant Vidyaniketan; A V Naik; Pune: 1102/B Shivaji Nagar; D B Kulkarni. Brand Name: Krishna.

INDIAN COMMERCIAL SYNDICATE, 11/2 Chetti-palayam Rd, Podanur, Coimbatore 641023; Ph: 25255, Gram: Iseeeyes; Partners: N Rajagopalaswamy Naidu, R Natarajan &

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INDUSS FEEDS, 238-B Acharya J C Bose Rd,
3rd Floor, Calcutta 700020; Ph: 441962,
432576, Gram: Vishant, Tlx: 021-4373;
Dir: S S Aggarwal, Ph off: 441874, resi:
434059; Gen Mgr: Dr S K Sarkar; Sales
Mgr: Sanjib Dey; Factory Mgr: Naren Dey.
Brand Name: Induss.

JAI KISAN AGRO PRODUCTS, C-3/4 Sanver Rd,
Industrial Estate, Indore 452003; Ph:
35458, 22055, Gram: Pashu Ahar; Partner:
Ashok Badjatiya, Ph resi: 23310. Brand
Name: Jai Kisan.

JALGAON JILHA SAHAKARI DUDH UTPADAK SANGH
MARYADIT, PB No 32, Near Erandol Naka,
Jalgaon 425001; Ph: 5611, 6645, 6646,
6647, Gram: Dudhvikas, Tlx: 753-216;
Mg Dir: Dr D K Toke. Cattle Feed
Plant: Nashirabad, Dist Jalgaon; Ph:
22; Mgr: D P Patil.

JAYALAKSHMI COTTON AND OIL PRODUCTS PVT LTD,
Perecherla 522009, Guntur Dist, AP; Ph:
22233, 24985, 22604, 24777. Gram: Oil-

product, Tlx: 0471-239 OIL IN; Mg Dir:
Ramesh Kumar Bolla, Ph resi: 31889;
Purchase Mgr: G H Prasada Rao. Brand
Name: Jayalakshmi.

K R V AGENCIES, Licensed Manufacturers of
Mysore Feeds; Off: 18 Dr Venkatraman
St, Gobichettipalayam; Ph: 193 & 293,
Gram: Keyarvee; Partners: C V Viswa-
nathan, G V Krishnamoorthy; Tech Mgr:
Dr R M Ramasamy. Factory: 3-F Mill Rd,
Gobichettipalayam 638476, Tamil Nadu.

KAIRA DISTRICT CO-OPERATIVE MILK PRODUCERS'
UNION LTD, Anand 388001; Ph: 3401, Gram:
Amuldairy, Tlx: 0172-208; Mg Dir: V H
Shah; Asst Gen Mgr (Planning & Engg):
R N Shah. Factory: Kanjari, Tal Nadiad,
Dist Kaira; Ph: 1449, 285 (Anand). Brand
Name: Amuldan.

KALYANI CONSULTANTS PVT LTD, Kalyani Bldg,
240-F Shaniwar Peth, Karad 415110, Maha-
rashtra; Ph: 2201, Gram: Kalyani; Dirs:
P S Kalyani, Dr K R Kulkarni.

KANU FEEDS, D2-D9 GIDC Estate, Antalia,
Bilimora 396321; Ph: 2751, Gram: Kanu-
feed; Prop: Kanu S Chandra

KAPSONS ENTERPRISES (Livestock Feeds), B-12/
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UP; Ph: 82; Prop: Prem Kapoor.

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KARNATAKA COOPERATIVE MILK PRODUCERS' FEDERATION LTD, 22 Poornima Bldg, J C Rd, 1st Cross, Bangalore 560027; Ph: 222691, Gram: Nandini; Mg Dir: C Muniswamy, IAS. **FEED PLANTS** — Bangalore: Rajankunte, Yelahanka, -560064; Ph: 193 (Yelahanka); Mgr: Puttaswamy; Tumkur: Gubbi, Near Rly Station, Tumkur Dist; Ph: 39 (Gubbi); Gen Mgr: Sannekan.

KARNATAKA STATE AGRO CORN PRODUCTS LIMITED, Agro Feeds Div, Bellary Rd, Hebbal, PB 2479, Bangalore 560024; Ph: 365281 (3 lines), Gram: Agrocorn; Mg Dir: K C Balasubramanian, Ph: 360828; Exec (Feeds): Dr M S Parthasarathy, Ph: 367314, resi: 367589. Regional Office: 869/A Vanivilas Rd, Siddappa Square, Mysore 570004; Ph: 23632, Gram: Agrocorn. Brand Name: Agro-feeds.

KERALA COOPERATIVE MILK MARKETING FEDERATION LTD — Cattle Feed Plants — Malampuzha: Mgr: A P Balakrishnan, Ph off: 8107, resi: 8176; Thuravoor: Pattanacaul PO, Alleppey Dist; Mgr: S Dakshinamoorthy, Ph off: 55, resi: 14 (Pattanakkad).

KERALA SOLVENT EXTRACTIONS LIMITED, PB No 20, Solvent Rd, Irinjalakuda 680121, Kerala; Ph: 2451, 2452, 2813, Gram: Sol-

vent, Tlx: 0887-217 KSEL IN; Mg Dir: K L Francis; Exec Dir: M C Paul; Gen Mgr: S K Menon; Works Mgr: Anand Menon; Secretary-cum-Finance Mgr: P K Viswanathan; Nutritionist: Dr Jose Pathadan; Mktg Mgr: C Mohan Das. Brand Names: K S Cattlefeed, Jersey (Deoiled Coconut Cake).

KERALA TRADING CORPORATION, PB No 54, Virudhunagar 626601, Tamil Nadu; Ph: 3061, Gram: Cow; Sr Execs: T K S P Arunachalam, T K S P Nagarajan, T K Shunmugam. Brand Name: KTC.

KOLHAPUR ZILLA SAHAKARI DUDH UTPADAK SANGH LTD, Kohlapur Gokul Project, Plot No B-1, MIDC, Gokulshirgaon 416234, Maharashtra; Ph: 11 to 15, Gram: Dudhsangh, Tlx: 0195-253; Mg Dir: S R Khadye. Cattle Feed Factory: Ph: 24347. Brand Name: Mahalaxmi.

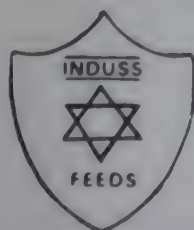
KOMARLA FEEDS, PB 7165, 'Komarlas', 53 Old Tharagupet, Bangalore 560053; Ph: 71305, 24834, Gram: Balkrishna; Partners: P S Nandakumar, Komarla Nagaraj; Nutritionist: Dr K Subba Reddy; Mktg Mgr: N Jagannathan. Factory: Chikkakallasandra, Subramanapuram Post, Bangalore 560061; Ph: 42076, 41483. Brand Name: Shanku.

KRISHNA SAHAKARI SAKHAR KARKHANA LTD, Feed Mills Div, Rethare Budruk, PO Shivnagar

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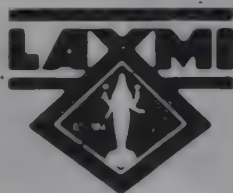
Phones: 2663 (Modakkurichi), 49 & 63 (Nathagoundenpalayam)

415108, Tal Karad, Satara Dist; Ph: 2306, Gram: Sakhar; Chmn: Jaywantrao K Bhosale; Vice-Chmn: S B More; Mg Dir: V L Tanpure; Nutritionist-cum-Production Mgr: Dr R G Ganzula. Brand Name: Krishna Ahar.

KWALITY ANIMAL FEEDS, C-1, B-7, Plot No 106, GIDC, Vithal Udyognagar 388121 (via Anand), Gujarat; Ph: 7451, resi: 1959; I J Chauhan. Brand Name: Kwalitiy.

L S P FATS & FEEDS, A-2 Block, Industrial Coop Estate, Udayapatti, Salem 634014, Tamil Nadu; Ph: 5162, 7683, Gram: Feeds, Tlx: 0450-215; Execs: B S Perumal, B P Purshottam, B P Udayakumar.

LAXMI CATTLE FEED INDUSTRIES, 329 Jawahar Nagar, Raipur 492001, MP; Ph: 23247, Gram: Himalaya; Partners: Jaiprakash Agrawal, M Agrawal.



LAXMI FEEDS & EXPORTS PRIVATE LIMITED, Tanna House Annexe, 11-A Nathalal D Parekh Marg, Bombay 400039; Ph: 2021165, 2020045, Gram: Laxmifeeds; Chmn: L J Tanna; Gen Mgr: Dr S Yamdagni; Mktg Mgr: Dr Sharad S Khambete. Factory: Shed No D-16, MIDC, Manpada Rd, Dombivli East, Dist Thane; Ph: 5505; Mgr/Nutritionist: Dr S S Godkhindi. Branch -- Bangalore: Office & Factory: M S Ramaiah Industrial Estate, Bangalore 560054; Ph: 360188, 363341, Gram: Laxmifeeds; Branch Mgr: K G Barchha. Brand Name: Laxmi.



LIPTON INDIA LIMITED, Animal Feeds Div, Laxminarayana Complex, 10/1 Palace Rd, PB No 5032, Bangalore 560052; Ph: 71536, 73508, Gram: Lipton, Tlx: 0845-8011; Vice-Pres: A Abraham; Tech Mgr: Dr K Srinivasan; Commercial Mgr: R Thomas; Buyer: R C Pota; Engineer: R Misra. NORTHERN REGION -- Branch Off: SCO 139/141, Sector 17C, Post Bag No 6, Chandigarh 160017; Ph: 33196, 42463; Gen Operations Mgr (North & East): R K Aneja; Branch Accountant: V K Puri. Production Units -- Ghaziabad: G T Rd, Post Bag No 3, -201009; Ph: 41220, Tlx: 0592-214; Area Mgr: N J Singh; Rajpura: Dhakansu

Rd, -140401, Dist Patiala; Ph: 251; Area Mgr: P Sharma. EASTERN REGION -- Production Unit -- Anilnagar: 11 Anilnagar, Budge Budge Trunk Rd, PO Mahesh-tala 743352, Dist 24-Parganas; Ph: 773633; Area Mgr: G Sengupta. SOUTHERN REGION -- Branch Off: 10 /1 Palace Rd, Bangalore 560052; Ph: 73508, 71536; Gen Operations Mgr: A Malhotra; Branch Commercial Mgr: V Sankaran. Production Units -- Bangalore: P Madurai Mudaliar Compound, Mysore Rd, -560026; Ph: 622468, 622569; Area Mgr: M Bhaskaran; Coimbatore: 2250 Trichy Rd, Singanallur, -641005; Ph: 872284; Area Mgr: V Subramanian; Hubli: C T S No 4/6, Pune-Bangalore Rd, -580024; Ph: 62468; Area Mgr: P F D'Lima; Hyderabad: Plot A-4, Sanathnagar, -500018; Ph: 261807, 263817; Area Mgr: A K Singhal. WESTERN REGION -- Branch Off: 4/38, 'Sumangala', Karve Rd, Pune 411004; Operations Mgr: Dr S V Vaidya. Production Units -- Ahmedabad: A 2/1 GIDC Sheds, Naroda Industrial Estate, Naroda, -382330; Ph: 827469; Area Mgr: S Narayanan; Khopoli: Vill Dheku, Takai Adoshi Rd, -410203, Tq Khalapur, Dist Raigarh; Ph: 617, 342; Area Mgr: A Saldana; Nagpur: B-4 MIDC Industrial Estate, Hingna, -440016; Ph: 7774; Area Mgr: S Kapoor; Surat: A-1 Pandesara Industrial Estate, PO Pandesara, -394221; Ph: 88370. Brand Name: Gold Mohur.

M P STATE COOPERATIVE MARKETING FEDERATION LTD, Cattle Feed Factory, Dhamdha Rd, Durg 491001, MP; Ph: 2076, 2767, 3185, 2600, Gram: Kisanfeed, Tlx: 0771-212 APEX IN; Gen Mgr: C M Mathur, Ph resi: 2801; Chief Sales Exec: J P Sharma. Sales Offices: Bilaspur, Durg, Jabalpur, Raipur, Satna. Brand Name: Taraju.

MAHALAXMI FEED & FERTILIZERS, 107 Bhawani Peth, Gul Ali, Pune 411002; Ph: 27569. Factory: Vadgaon Maval, Bombay-Pune Rd, Dist Pune.



MAHARASHTRA AGRO-INDUSTRIES DEVELOPMENT CORPORATION LTD, THE, Rajan House, 3rd Floor, Opp Century Bazar, Prabhadevi, Bombay 400025; Ph: 4228211-3, Gram: Krushiudyog, Tlx: 011-6044 AGRO IN; Mg Dir: A K D Jadhav, IAS, Ph: 4220823;

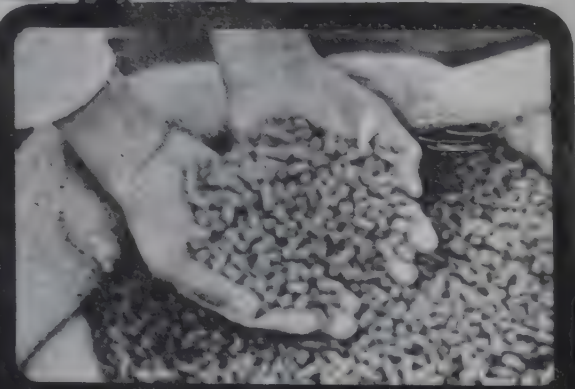
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 Mgr: K R Thakare; Aurangabad: Shakti
 Sahkar Bldg, Near S T Stand, -431001;
 Ph: 4598; Mgr: T S Tamboliya; Kolhapur:
 Maharani Tarabai Chowk, -416001; Ph:
 27314; Mgr: V S Deshmukh; Nagpur: 1
 Manoj Ramdas Peth, -440010; Ph: 34820;
 Mgr: A M Pandey; Nanded: Shivaji Nagar,
 Indl Estate, -431602; Ph: 3402; Mgr: S R
 Dagadgunde; Nasik: Deolali Naka New Bom-
 bay Agra Rd, -422001; Ph: 75878; Mgr: L
 K Chatur; Pune: Leela Chambers, 2nd
 Floor, Arunyeshwar Corner, Pune-Satara
 Rd, -411009; Ph: 443034-35, Gram: Maha-
 agro, Tlx: 0145-423; Regl Mgr: D S
 Sable; Ratragiri: Swanand Niwas, 3209/B,
 First Floor, Tilak Ali Naka Bandar Rd,
 -415612; Ph: 2246; Mgr: S D Patil.
Sugras Factories -- Chinchwad: D-52 MIDC
 Plct, -411019; Ph: 82655; Mgr: Dr S M
 Sonalkar; Kolhapur: A-34 MIDC Indl
 Estate, Shirol; Ph: 8104; Mgr: A V
 Pisei; Yeotmal: Alap Cattle Feed Fac-
 tory, Near S T Stand, -445001; Mgr: A L
 Tare; Ph: 2674. Brand Name: Sugras.
MALAV FEEDS & FERTILIZERS, 337 Shivaji
 Nagar, Indore 452003; Ph: 4466, Gram:
 Malavfeed; Mg Partner: Ravindra Bafna.
Brand Name: Kamdhenu.
MARKFED FEED MIXING PLANT (A unit of AP
 State Coop Mktg Fed Ltd), 30/109 Vijaya
 Nagar, Nandyal 518501, AP; Ph: 640,
 Gram: Feeds. Brand Name: Markfed.
MARKFED REFINED OIL & ALLIED INDUSTRIES,
 Kapurthala 144601, Punjab; Ph: 2747,
 2775, 2885, Gram: Markfed, Tlx: 0395-
 213 MFED IN; Gen Mgr: G S Chahal, Ph
 off: 2747, resi: 2980. Brand Name:
 Punjab Markfed.
MEHSANA DISTRICT COOPERATIVE MILK PRODUCERS'
UNION LTD, PB No 1, Mehsana 384002; Ph:
 22201 (5 lines), Gram: Dudhsagar, Tlx:
 0122-204; Mg Dir: B C Bhatt.
METTA FEED SPECIALITIES, 217/3 RT Saidabad
 Colony, Hyderabad 500659; Ph: 559461 PP;
 Prop: Dr V C Metta.
MODERN FEED MILLS, Pipli Rd, Kurukshetra
 132118; Ph: 60; Mg Partner: A C Mittal,
 Ph resi: 1406. Brand Name: Modern.

Advertisements in this YEARBOOK themselves serve as a Who's Who of the industry. They serve as the manufacturer's catalogue and supplement the basic data give in the various listings.



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MYSORE FEEDS PVT LTD, 283-284 Old Tharagupet,
 PB No 7884, Bangalore 560053; Ph: 71471,
 Gram: Myfeeds, Tlx: 356; Tech Dir: M K
 Dattaraj; Dirs: A Venkataramana Setty,
 M K Panduranga Setty, M K Ramachandra,
 A V S Murthy, M P Shyam. Factory: Nayanda-
 halli, Mysore Rd, Bangalore 560039; Ph:
 601190. Brand Name: Milkcan.
NANDI PROVENDER MILLS, 33 Shivaji Marg, New
 Delhi 110015; Ph: 531331, 531372, Gram:
 Jawalabhog; Chief Exec: Vineet Virmani.
Brand Name: Nandi.
NANDYAL AGRO-VET INDUSTRIES PVT LTD, Ganga-
 varam 518583, Kurnool Dist; Ph: 546
 (Nandyal); Mg Dir: G Vijaya Raghavan.
Branches: Hyderabad, Pamarru, Chittoor,
 Bellary.
NAV MAHARASHTRA CHAKAN OIL MILLS, 42/43
 Shankar Sheth Rd, Poona 411037; Ph:
 66406-8, resi: 63509, Gram: Shenga,
 Tlx: 0145-349; Partner: P S Lunkad.
Branch: Plot No A-12, MIDC, Ahmed-
 nagar; Ph: 55. Brand Name: Amrut.
ORISSA AGRO INDUSTRIES CORPORATION LTD,
 95 Satyanagar, Bhubaneswar 751007; Ph:
 53396, 51573, Gram: Orissagro; Mg Dir:
 Dr S N Pradhan; Dep Gen Mgr (Feed):
 Dr R K Patnaik; Dep Gen Mgr (Mktg):
 Dr P B Tonpe. Feed Plants: Berhampur,
 Mancheswar, Sambalpur. Brand Name:
 Suravi
PERIYAR DISTRICT COOPERATIVE MILK PRODUCERS'
UNION LIMITED, Cattle Feed Plant, Chennai-
 malai Rd, Erode 638002; Ph: 78621, Gram:
 Peri Milk, Tlx: 0856-203; Gen Mgr: P
 Sonai; Mgr (Cattle Feed): Dr K M Loga-
 nathan. Brand Name: Aavin.
PRADESHIK COOPERATIVE DAIRY FEDERATION LTD,
 29 Park Rd, Lucknow 226001; Ph: 44401.
Cattle Feed Plants -- Meerut: Gangol Rd,
 Partapur; Ph: 76241, Gram: Dairyfed, Tlx:
 0594-237; Mgr: Dr S Gupta; Varanasi: Ram
 Nagar; Mgr: G B Tiwari. Brand Name: Parag.

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21725, 34014, Gram: Prestige, Tlx: 0735-205 PFM IN; Chmn & Dir: N N Jain; Dirs: Davish Jain, Dipin Jain, Smt Sunita Jain; Mgr, Product Dev: Manmath Patni; Mgr, Production: Sharad Kumar Dubey. Factory: 10-B & 11-A Industrial Area, Sanwer Rd, Indore 452003; Ph: 34460. Marketing Div: 79-B Udham Singh Nagar, Civil Lines, Ludhiana 141001; Ph: 35422 care 35610, 38316; Chief Mktg Exec: Suresh Kumar Jain. Branches — Ambala: Swastik Feeds, Hissar Rd, 7th km, Vill & PO Balana, -134003; Ph: 57690; Mgr, Production & Admn: Lalit Jain; Tech Sales Exec: Dr K M Srivastava; Nutritionist: Dr Ajay Rishi; Hyderabad: Prestige Feeds, 8/8 km Stone, Nagarjuna Sagar Rd, Bhyramalguda, -500963; Ph: 559407, Gram: Prestige; Mg Partner: R C Chadha. Brand Name: Prestige.

PRESTIGE FEEDS, 8/8 km Stone, Nagarjuna Sagar Rd, Bhyramalguda, Hyderabad 500963; Ph: 559407, Gram: Prestige; Mg Partner: R C Chadha, Ph resi: 226135. Brand Name: Prestige.

PUNJAB POULTRY DEVELOPMENT CORPORATION LTD, THE, Kothi No 517, Sector 33-B, Chandigarh 160031; Ph: 20698, 28491, Gram: Poltrycorp; Mg Dir: B R Bajaj, IAS; Gen Mgr:

Dr G S Chahal; Sales & Mktg Mgr: Gamdoor Singh Sandhu. Feed Processing Centres: Chandigarh, Gurdaspur, Jalandhar, Ludhiana, Patiala. Brand Name: PPC.

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RADHA ENTERPRISES, 69 Bagh Diwar, Fatehpuri, Delhi 110006; Ph: 2512230, 2512240, 2512250; Mg Partner: Ashok Kumar Aggarwal; Partner: Jagdhir Singh Gulia. Branch: Mandi Kesar Ganj, Ludhiana; Ph: 29775, 22173; Partner: Vijay Kumar Aggarwal. Brand Name: Radha.

RAJASTHAN COOPERATIVE DAIRY FEDERATION LTD, Jaipur 302004; Ph: 78791-94, Gram: Dairy-corp. Cooperative Cattle Feed Factories — Ajmer: Beawar Rly, -305003; Ph: 22945; Dep Mgr: Ahmed Khan; Bharatpur Dist: Nadbai Town 321602; Ph: 39; Bikaner 334007; Ph: 4539; Dep Mgr: S P Singh; Jaipur: 88 Industrial Area, Jhotwara, -302012; Ph: 842282, Gram: Cattlefeed; Mgr: B S Abusaria; Jodhpur 342003; Ph: 27173; Dep Mgr: S N Mauchawa. Brand Name: Coop Feed.

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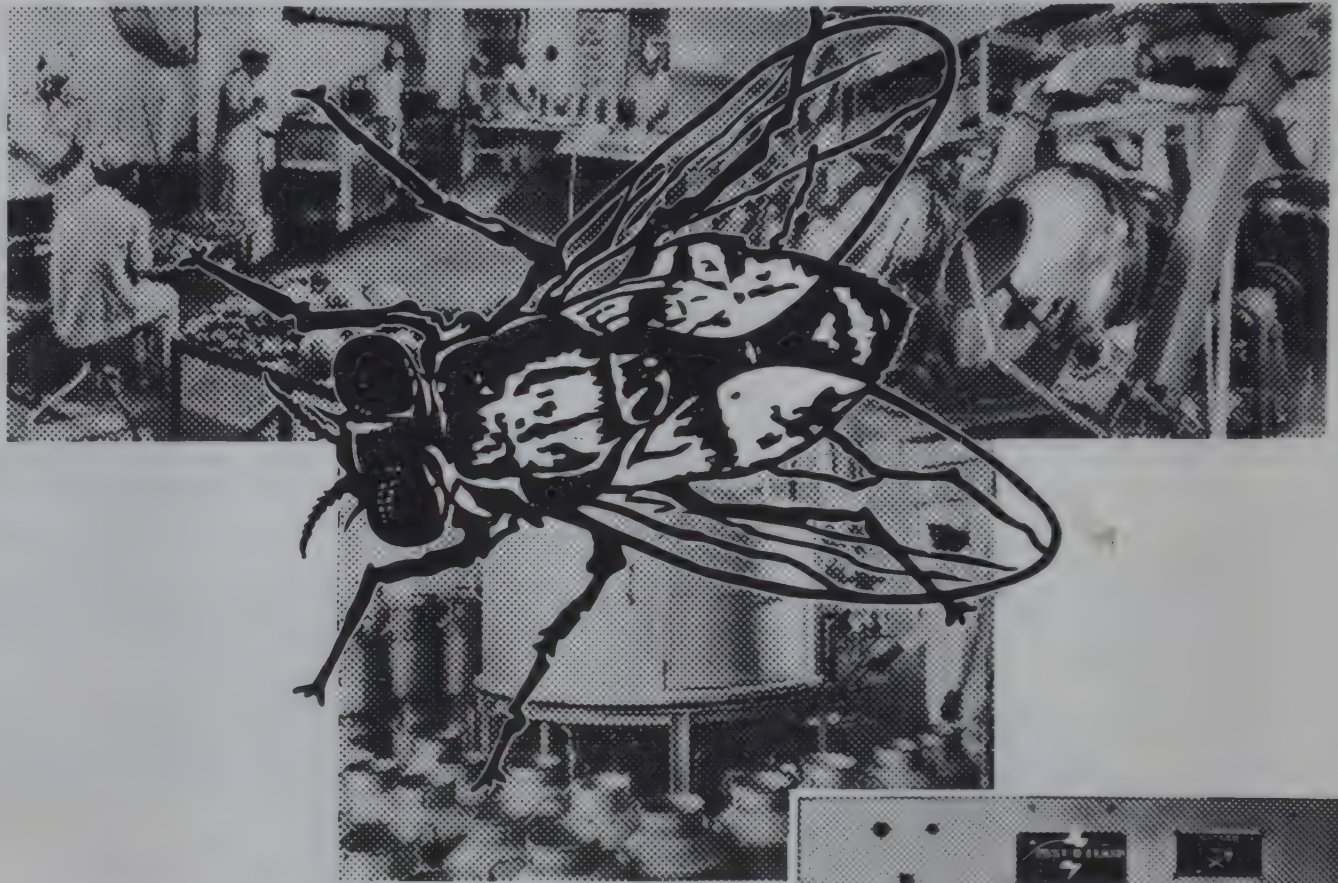
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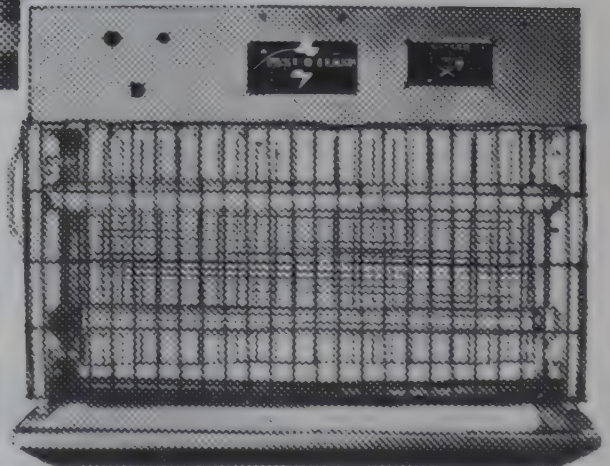
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Dist Darjeeling; Ph: 22276; Mg Partner:
Shyam Sunder Agrawal. Brand Name: Roma.

RYOTS AGRICULTURAL PRODUCE COOPERATIVE
MARKETING SOCIETY LTD, PB No 10, Man-
dya 571401, Karnataka; Ph: 38, Gram:
Ryots; Mg Dir: B M Purushothama Raju.
Brand Name: Mandya.

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Factory & Regd Off: Chavadipalayam
Pudur Rd, Nanjaiuthukuli, Modakkurichi
683104, Periyar Dist, Tamil Nadu; Ph:
2663 (Modakkurichi), 49 & 63 (Natha-
goundanpalayam), Gram: Poultry, Tlx:
0856-226 SKM IN; Mg Dir: S K Mysamy
Gounder. Sales Off: 49/C, Gandhiji Rd,
Erode 638002; Ph: 75214, 75215, 73667.
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S M FEEDS PVT LTD, Anim Feeds Div, 250
Subbiah Mudaliar St, PB No 198, Coimba-
tore 641001; Ph: 22992, Gram: Fagun,
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Jairamdas Savaldas.

SABARKANTHA DISTRICT CO-OPERATIVE MILK
PRODUCERS' UNION LTD, Cattle Feed Fac-
tory, PB No 21, Himatnagar 383001; Ph:
801, 807, Gram: Sabardairy, Tlx: 012-
291; Mg Dir: B K Rabari; Mgr (CFP):

Tribhovanbhai S Patel. Brand Name:
Sabardan.

SHAH CHEMICAL & FERTILIZER PVT LTD, 1875
Dhan Nivas, Atabhai Avenue, Bhavnagar
364002; Ph: 24578-79, Gram: Cattlefeed;
Mg Dir: Jayendra Shah. Brand Name: Shah
Cattle Feed.

SHETKARI SAHAKARI SAKHAR KARKHANA LTD,
Cattle Feed Div, PC & Rly Station
Sangli 416416; Ph: 2611-20, Gram:
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Patil. Brand Name: Khurak.

SHREE BHARAT INDUSTRIES, 'Bharat Illam',
RRC 9, Thirunagar, Madurai 625006; Ph:
8114; Prop: Dr D V Subaschandran. Sales
Depot: 156/I Salem Rd, Namakkal 637001.
Factory: D-20 SIDCO Estate, Kappalur,
Madurai 625006. Brand Name: DVS.

SHRI BHAGWATI GENERAL MILLS, Anim Feed Sec-
tion, Bhagwati Chamber, Gurudawara Sun-
der Singh Rd, Jammu 180001; Ph: 5862,
Gram: Bhagwati; Prop: Subhash Gupta,
Ph resi: 46910.

SHUNMUGAMOCHAN TRADING COMPANY, PB No 43,
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mugamurthy.

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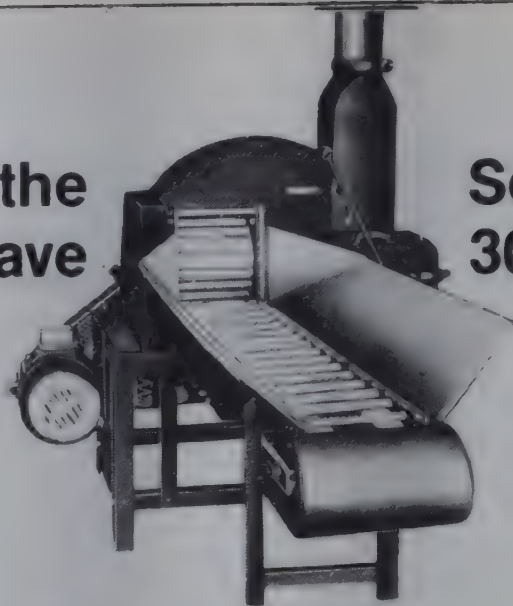
Branch:

14-9-74, Goolingspet,
CHITTOOR 517 001
(Andhra Pradesh)

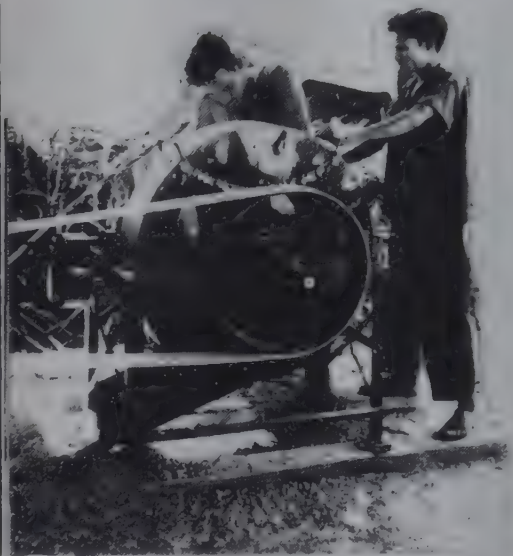
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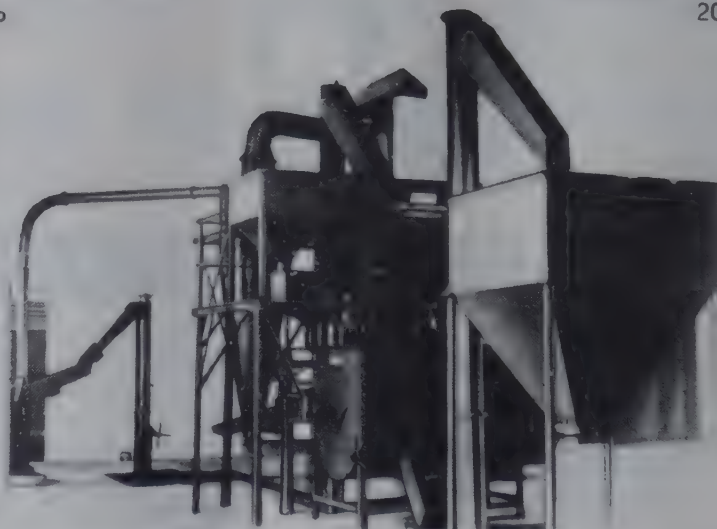


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nagar 626001, Tamil Nadu; Ph: 4699, 4799, Gram: Weco; Mg Partner: T K S P Nagarajan. Brand Name: Weco.

STANDARD FEEDS, 6 Industrial Estate, Gangyal, Jammu 180010; Mg Partner: Dr M A Malik. Branches — Jammu: Shermaliks, 763 Subhashnagar Rehari Colony, -180005; Ph: 44447; Srinagar: Mohd Rajab Kohroo, Auqaf Bldg, Shop No 7, Gojwara, -190002.



SUDARSHAN FEEDS, 9150 Sha Damji Bldg, Neeligin Rd, Hubli 580029; Ph: 65401. Factory: Jagadish Baug, 185 Rayapur, Hubli-Dharwad Rd, Hubli 580025; Ph: 72304, Gram: Cage-feeds; Mg Partner: Dr C G Ponnappa; Partners: Dr M N Kulkarni, A C Hakkapakki. Brand Name: Sudarshan.

SURAT DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Sumuldan Factory, Chalthan 394305, Dist Surat; Ph: 162 to 165 (Kadodra Exch), Gram: Sumuldan; Mgr (Sumuldan): G G Patel. Brand Name: Sumuldan.

SWASTIK FEEDS, 7th Km, Hissar Rd, Vill & PO Balana 134003, Dist Ambala, Haryana; Ph: 57690, resi: 58907, 56968; Mgr, Production & Admn: Lalit Jain; Tech Sales Exec: Dr K M Srivastava; Nutritionist: Dr Ajay Rishi. Brand Name: Prestige.

TAMIL NADU COOPERATIVE MILK PRODUCERS' FEDERATION LIMITED, Cattle Feed Unit, Madhavaram Milk Colony, Madras 600051; Ph: 575188, 575821, Gram: Aavin Feeds; Mgr, Cattle Feed: Dr Y Krishnaswamy Naidu, Ph: 423722; Dep Mgr (Prod): Dr Duraiswamy Raja; Asst Mgr (Nutrition): Dr Nandakumar.



TATA OIL MILLS COMPANY LIMITED, THE, Anim Feeds Div, Bombay House, 24 Homi Mody St, Fort, Bombay 400023; Ph: 2049131-508, Gram: Tatoils, Tlx: 011-2618 TATA IN; Gen Mgr (Foods): Cmde K M V Nair, Ph off: 2047420, resi: 234615; Mgr, Anim Feeds Div: Fali N Madon. Regional Offices — NORTH ZONE: Mgr (North Zone): Dr S S Chabbra, A-17 Nirman Vihar, Delhi 110092; Ph: 2242646; Sales Reps: Dr K S Kochar, Dr D K Saxena; Ambala: c/o Bhagat Jaswant Singh & Refrigeration Enterprises,

Bhagat Jaswant Singh Marg, Ambala City, Haryana; Offr Incharge: P K Baveja, Ph: 56724, 56684, resi: 56095; Ghaziabad Factory: Loni Rd, PO Mohan Nagar, Ghaziabad, UP; Ph: 866648, 866645, 866712; Offr Incharge: Dr N K Malhotra. SOUTH ZONE: Zonal Off: 174, M G Rd, 1st Floor, Bangalore 560001; Ph: 576375, 563794; Mgr (South Zone): Dr S George, Ph resi: 576675; Bangalore Plant: 16th Mile Tumkur Rd, Maya Industrial Estate, Madawara, Nagasandra PO, Bangalore 560073; Ph: 385673; Offr Incharge: Dr B V Joshi; Sales Reps: Dr C S Rao, Dr T S Seshadri; Coimbatore Plant: Sundarapuram PO, Coimbatore 641024; Ph: 86291; Offr Incharge: K K P Menon; Sales Reps: Rajagopal, Alexander, B N Suresh; Madras Factory: 18/22 Elaiya Mudali St, Tondiarpet, Madras 600081; Ph: 551021, Tlx: 7235; Sales Reps: E W P Ezekil, Venkataramaiah. WEST ZONE: Bombay Plant: c/o Cossac Processors, Sr No 186, Plot No 4H, Vill Purna, Bhiwandi Tq, Thana Dist; Ph: 925-7974; Offr Incharge: S K Tripathi; Sales Reps: Dr S Kshirsagar, U S Singh; Karad Plant: c/o Prasant Processors, Sadashivgad, Ogalevadi, Karad; Ph: 2555; Offr Incharge: Dr E K Sawhney; Sales Reps: M S Deshpande, Ambedkar; Navsari Plant: Tata Baug, Lunsuki, Navsari, Gujarat; Ph: 3025; Sales Reps: Dr U M Huddar, J K Arekar. Brand Name: OK.

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U P STATE AGRO INDUSTRIAL CORPORATION LTD, Regd Off: 22 Vidhan Sabha Marg, Lucknow; Ph: 73251, Gram: Upagro (Daliganj); Balanced Livestock Feed Tiv (Khanna Mills): Daliganj, Lucknow; Gen Mgr: Dr S C Pandey. Branches — Agra, Aligarh, Allahabad, Bareilly, Faizabad, Gorakhpur, Jhansi, Meerut, Ruderpur, Varanasi. Brand Name: Agro.

USHA FEEDS & ANCILLARIES PVT LTD, 24 R N Mukherjee Rd, Calcutta 700001; Ph: 235396, 222168, Gram: Oilusha, Tlx: 021-2608; Dirs: H K Goenka, H K Balasubramanya. Brand Name: Usha.

VARDAN FEED MILLS, Bhaiwala Chowk, Ghumar Mandi, Ludhiana 141001; Ph: 31780, 30948, Grams: Bardaan; Mg Partner: Brij Mohan Kaura. Factory: Vill Kadian, PO Bhatian, G T Rd, Ludhiana.

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WEST BENGAL DAIRY & POULTRY DEVELOPMENT CORPORATION LIMITED, 16 Netaji Subhas Rd, 3rd Floor, Calcutta 700001; Ph: 229432, 221955, 224422, 224802, Gram: Dairy-poul; Mg Dir: K P Banerjee; Dep Mgr (Mktg): S B Chowdhury; Dep Mgr (Purchase): S N Basu. Feed Plants: (i) Kalyani Feed Milling Plant, D-23 Industrial Area, Kalyani, Nadia; Ph: 475 (Kalyani); Mgr & Nutritionist: A Sinha; (ii) Pradhan Nagar, Siliguri, Darjeeling; Ph: 2113. Brand Name: Epic.

YARANA FEEDS & FARMS, B-55, 56 & 87 Industrial Estate, PB No 2, Hubli 580030, Karnataka; Ph: 64875, 64450, Gram: Yarana; Dirs: Dr N S Dronawat, Rajan Thakkar. Brand Name: Yarana.

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BALAJI FOODS & FEEDS LIMITED, 4H Subhodaya Apartments, 4-1-1233 Bogulkunta, Hydera-

bad 500001; Ph: 237254, 237355, 236424, Tlx: 0155-6724; Dirs: C Jagapati Rao, M P Seshaiyah. Brand Name: Balaji.

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE (BAIF), Uruli-Kanchan 412202, Dist Pune; Ph: 248, 265; Specialist: Dr A L Joshi.

KAVERI FEEDS, 14 Paramathi Rd, Namakkal 637012, Tamil Nadu; Ph: 2828; Mg Partner: P Veerappan, Ph (resi): 2028.

MAHAKALI PROTEIN FOOD & FEED, 207 Maharashi Devendra Rd, Calcutta 700070; Ph: 337883, 456921, 459470, 665947 (Factory), Gram: Foodfeed; Chief Execs: H P Kanoria, B L Kanoria, S B Kanoria; Consultant: Dr B C Chakravorti. Brand Name: Mahakali.

PODDAR SOYA PRODUCTS PVT LTD, 605 Dalamal Chambers, 17 New Marine Lines, Bombay 400020; Ph: 250125, 290518, Gram: Podsoya, Tlx: 011-4624; Mg Dir: S N Poddar. Delhi Off: Ph: 6417214, 6417085.

SUNFARM FEEDS (A Div of Modern Mills Ltd), Karwar Rd, Hubli 580020, Karnataka; Ph: 63922, 62396, 62397, Gram: Sundatta, Tlx: 0865-221; Gen Mgr: A Venkateswaran; Mktg Mgr: T S Mani. Brand Name: Sunchick.

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Gandhinagar 352030

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Madras 600052

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ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, Lalapet, Hyderabad 500017; Ph: 71851 to 71859, Gram: Lalapet, Tlx:0155-545; Mg Dir: K Sadasiva Rao, IPS. Farm: Fodder Seed Production Farm, Nakarikallu 522615, Guntur Dist; Ph: 28; Project Mgr: Dr G Muthyalu.

ANDHRA PRADESH STATE SEEDS DEVELOPMENT CORPORATION LTD, No 11-5-471/1 Red Hills, Hyderabad; Ph: 34001, 34010, Gram: Apseeds; Mg Dir: Yogeswara Rao. Products: MP Chari, Sorghum.



ANDHRA SEEDS CORPORATION, PO Box 135, Hyderabad 500001; Ph: 236312, Gram: Seedfarm; Mg Partner: M A Hussain, Ph (resi): 38078; Chief Exec: Shahed Hussain. Products: Cow pea, Lucerne, MP Chari, Maize, Stylohamata, Sweet sudan grass. Brand Name: hyspo seeds.

BHARATIYA AGRO-INDUSTRIES FOUNDATION (BAIF), Uruli-Kanchan 412202, Dist Pune; Ph: 248, 265, 347, 348, Gram: Baifon, Tlx: 0145-283; Chief Exec: Dr D S Gorhe; Fodder Specialist: Dr L L Relwani. Products: African Tall Maize, Lucerne, Napier, Sorghum, Subabul (*Laucaena leucocephala*).

CENTRAL ARID ZONE RESEARCH INSTITUTE, Jodhpur 342001; Ph: 21984; Dir: Dr H S Shankaranarayana.

CENTRAL CATTLE BREEDING FARMS, Govt of India — Avadhi (Madras) 600052; Ph: 680508; Dir: Dr M P Nagpal; Chiplima: PO Basantpur 768111, Dist Sambalpur, Orissa; Ph:

Burla-23; Dir: Dr A D Chhabra; Dhamrod: Tal Mangrol 362225, Dist Surat, Gujarat; Dir: Dr S K Sinha; Hessarghatta: Bangalore 560088, Karnataka; Ph: 384272; Offr Incharge: Dr P A Sarma; Lakhimpur-Kheri: Andeshnagar, PB No 63, -262701, UP; Ph: 2535 (Lmp); Dir Incharge: H S Rathore; Sunabeda: Dist Koraput 763002, Orissa; Ph: 390; Dir: Dr B K Singh; Suratgarh 335804, Rajasthan; Ph: 91; Dir: Dr S P S Tomar. Products: Bajra, Barley, Berseem, Cow pea, Guar, Lucerne, MP Chari, Maize, Oats, Sorghum.

CENTRAL FODDER SEED PRODUCTION FARM, Govt of India, Hessarghatta, Bangalore 560088; Ph: 384272, Gram: Fodderseed; Dir Incharge: S C Bhattacharyya. Products: African Tall (improved variety), Cow pea variety EC 4216, Dolichos (HG), Lucern (T-9), MP Chari, Maize (HGT-3), PC 23 & PC6, R G Sorghum variety, Subabool.

COLLEGE OF AGRICULTURE, Punjab Agricultural University, Ludhiana 141004; Ph: 22960.

G B PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY, Livestock Research Centre, PO Dairy Farm, Magla 263149, Dist Nainital.

G NANDAGOPAL NADAR, 53 Sivankovil Lane, Tuticorin 628002, Kerala; Ph: 23437, Gram: Beldona; Prop: G Nandagopal. Products: Andropoan Sorgun, *Cenchrus ciliaris* seeds, Cow pea, Subabul *sesbania grandiflora*.

GANGA KAVERI SEEDS PVT LTD, 8-2-674/B-3-3 Road No 12, Banjara Hills, Hyderabad 500034; Ph: 227060, 227298, 67826, Gram: Gangaseed; Dir: Srikanth Reddy. Regd Off: BF/5D, DDA Flats, Munirka, New Delhi 110067; Ph: 666090, 656790, 651117; Mg Dir: M V Reddy; Dir: P M Reddy. Zonal Off: 24-A Green Field, Pakholva Rd, Ludhiana 141002, Punjab. Products: African Tall, Maize, Sorghum sudan grass (Hybrid), Typhon (multicut).

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GOVERNMENT LIVESTOCK FARM, Govt of Haryana, Hisar 125001; Ph: 2317, 4179, Gram: Farm; Chief Supdt: P K Gupta, IAS; Asst Supdt (Stock & Res): Dr S L Yadav; Sector Supdt-I: Dr S S Talwar.

GUJARAT STATE SEEDS CORPORATION LTD, Beej Bhavan, Sector 16, Gandhinagar 382016; Ph: 22531, 22328, Gram: Seeds. Product: Lucerne.

HARYANA SEEDS DEVELOPMENT CORPORATION LTD (A State Govt Undertaking), SCO 169-170, Sector 8C, Chandigarh 160008; Ph: 20051, 22168, 22196, 22097, Gram: Harbeej; Mg Dir: R S Malik, IAS; Mktg Mgr: A K Usman. Products: Barseem: Mascavi, Cowpea, HFC-42-1; Guar: FS-277, HG-75, HG-119, HFG-182; Oats: HFO-114, OS-6, Kent; Sorghum: JS-20, HC-136; Bajra: HC-4, WCC-75; Maize: Ageti.

INDIAN AGRICULTURAL RESEARCH INSTITUTE, Agro-Economy Centre, Pusa, New Delhi 110012; Ph: 582763; Sr Scientist: Dr H K Singh.

INDIAN GRASSLAND & FODDER RESEARCH INSTITUTE (IGFRI), Pahuj Dham, Gwalior-Jhansi Rd, Jhansi 284003, UP; Ph: 908, Gram: Ghas-anusandhan; Dir: Dr Panjab Singh, Ph: 833; AICRP on Forage Crops, Proj Coordinator: Dr C R Hazra. Products: Arjan

grass IGFRI 3108, 3133; Berseem IGFRI 99-1; Cowpea IGFRI 450, 457, 978, 985; Dinanath IGFRI 3108, 43-1; Lucerne IGFRI 244; Marvel grass IGFRI 495-1, 495-5; Oats IGFRI 2688, 3021; Sorghum H1, H2, H3.

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Izatnagar 243122, UP; Ph: 74069; Dir: Dr P N Bhat; Head, Animal Nutrition Div: Dr Kedar Nath.

KAIRA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Amul Dairy Rd, Anand 388001, Gujarat; Ph: 3402; Mg Dir: V H Shah; Gen Mgr (Comml): J M Shah.

KERALA LIVESTOCK DEVELOPMENT & MILK MARKETING BOARD LTD, Moovattupuzha 686669, Kerala; Ph: 2763; Offr Incharge: Dr C T Chacko; Livestock Dev Offr: Dr P J Joseph. Products: Brachiaria ruziziensis, Centrosema pubescens, Desmodium species, Leucaena leucocephala, Melinis minutiflora, Panicum maximum, Setaria anceps, Stylosanthes guineensis.

LAXMI SEED CANERS, 11 Mhow Rd, Neemuch 458441, Madhya Pradesh; Ph: 486, Gram: Canars. Products: Cowpea fodder, Lucerne Australian (PV), Lucerne Berseem culture, Lucerne Sirsa - 9 (PV).

LAXMINARAYAN & SONS, Dr Bhabha Rd, Neemuch 458441, Madhya Pradesh; Ph: 567, Gram:

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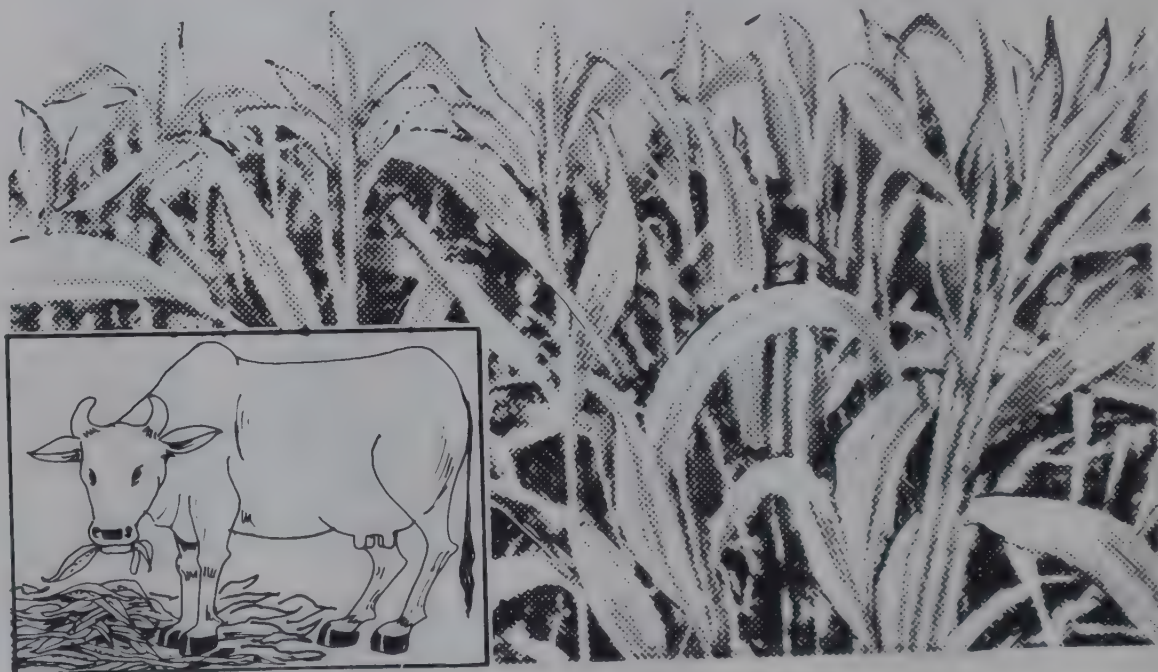
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MADHYA PRADESH DUGDHA MAHASANGH (SAHAKARI) MARYADIT, Guru Tegh Bahadur Complex, Roshanpura, Bhopal 462003; Ph: 61365, 66068.

MAHARASHTRA STATE SEEDS CORPORATION LTD, Plot No 8, Amankhan Plot, Shastri Nagar, Akola; Ph: 2380, 3008, Gram: Mahabeej.

NACHALUR PLANATATIONS PVT LTD, 7 Justice Sundaram Rd, Nageswarapuram, Madras 600004; Ph: 74158; Dirs: S R Raman, V M Ramalingam, S Easwaran, S Ramanujam. Product: Hawaiian Gaint Subabul Seeds.

NATIONAL DAIRY RESEARCH INSTITUTE, Karnal 132001; Ph: 2126; Dir: Dr R Nagarcenkar; Scientist Incharge, Fodder Production: Dr H P Tripathi. Crops: Anjan grass, Bajra, Berseem, Chinese cabbage, Cowpea, Guar, Hybrid Napier, Hybrid Napier + Berseem, Jowar Lucerne, Maize, Maize + Cowpea, Makchari, Para grass, Oats, Sweet Sudan, Turnip, Velvet Bean.

NATIONAL SEEDS CORPORATION LIMITED (A Govt of India Undertaking), Beej Bhavan, Pusa

Complex, New Delhi 110012; Ph: 5712292, 5712295, Gram: Rajbij, Tlx: 031-3705; Mg Dir: Dr S K Sengupta, Ph: 588906; Gen Mgr (Production): K C Katyal, Ph off: 588827, resi: 520498; Gen Mgr (Mktg): S Sankaran, Ph off: 582078, resi: 5434865; Mgr (O&P): Dr K S R K Shankara Rao, Ph off: 589216, resi: 589796; Dep Mgr (Mktg): J L Bhat; Seed Offr (Pulses & Fodder): S D Ramtri. Regional Offices: Ahmedabad, Bangalore, Bhopal, Calcutta, Chandigarh, Delhi, Guwahati, Hyderabad, Jaipur, Lucknow, Patna, Poona, Solan, Srinagar, Trivandrum. Crops: Bajra (L-72), Berseem (Diploid, Pusa Giant, Tetraploid), Cowpea (NP 3, HFC 42-1, UPC 5288), Guar (FS 277, HPF 119, HG 75), Lucerne (T-9), Maize (African Tall), Oat (Kent), Sorghum (MP Chari, PC 6, PC 23, HC 136).

PIONEER SEED COMPANY LIMITED, 8-1-39 Toli-chowki, Hyderabad 500008, Andhra Pradesh; Ph: 31450, 31759, 39329, Gram: Pioseed, Tlx: 0425-6662; Pres: T R Sawheny; Mktg Mgr: A N Jha. Regd Off: C-37 Atma Ram House, Connaught Place, New Delhi 110001. Product: Sorghum sudan grass Hybrid SSG 988. Brand Name: Pioneer.

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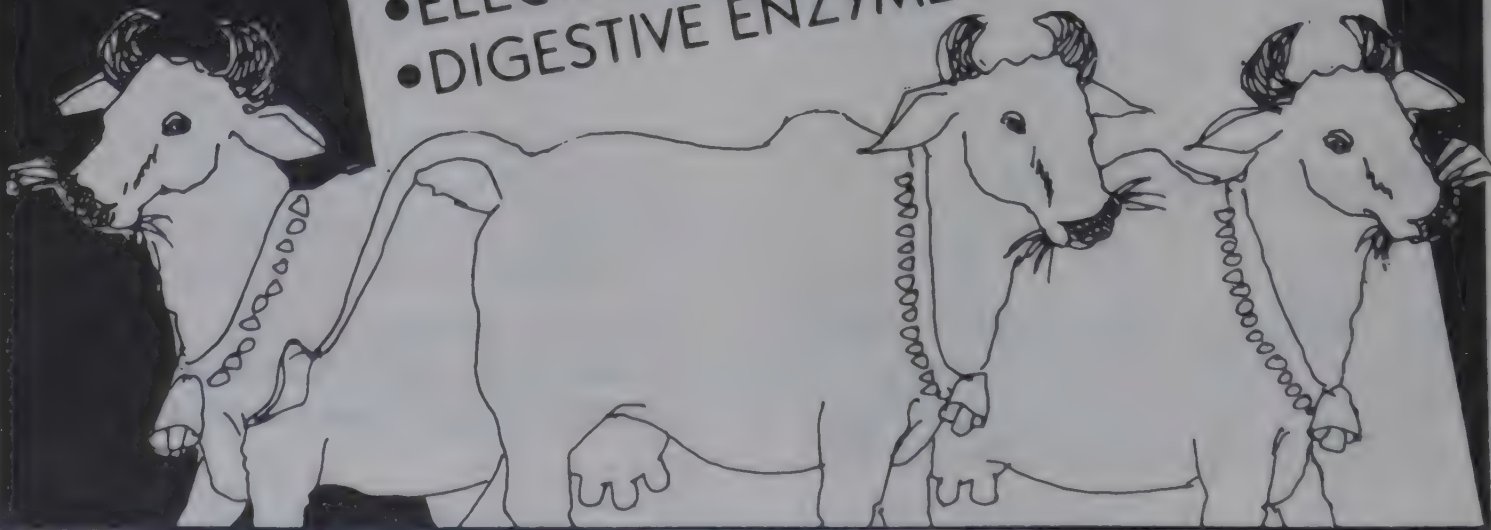
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PUNJAB STATE SEEDS CORPORATION LTD, SCO No 835-836, Sector 22-A, Chandigarh 160022; Ph: 20433, 22036. Product: Berseem.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION, Mamidipalli, via Keshav-giri, Hyderabad 500005; Ph: 239260, 239226, Gram: Centforage; Dir Incharge: M S Verma. Products: Bajra, Cenchrus, Cowpea, Dinanath, Maize (AT), Sorghum, Stylo.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), GH-128/2, Sector 30, Gandhinagar 382030, Gujarat; Ph: 21273, Gram: Prachara; Dir Incharge: M Kamil. Farm: Pallaj, Dist Gandhinagar. Products: Bajra (Giant & Rajko), Barley-Jyoti, Cenchrus varieties, Chinese cabbage, Cowpea (EC-4216 & Russian Giant), Dolichos Lab Lab-2214, Guar (FS-277 & IGFRI 212/1), Lucerne (T-9 and Anand-2), Maize (African Tall & Vijay composite), Oat-Kent, Siratro (Improved), Sorghum (PC-23, HC-136, SSG-59/3), Stylo-Hamata, Subabool-Australian Common.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), PO Textile Mills, Hisar 125002, Haryana; Ph: 4184, Gram: Growfodder; Dir: Dr G P Singh, Ph (resi): 5036. Products: Barley (BH-75), Berseem (Mascavi, BL-1, Warden); Cowpea (NP 3, HFC 42-1); Guar (HG 75 HFG 119); Maize (SAT, Ganga-5, Vijay Comp); Oats (Kent, HFO-114, PO-34, OS-6); Rape & Mustard (Chinese, Cabbage); Sorghum (MP Chari, HC-136, S-171); Teosinte (Sirsa Imp).

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), Shabir Manzil, Rajbagh (Extn), Srinagar 190008; Ph: 76681, Gram: Growfodder; Dir Incharge: R S Pandey. Products: Cowpeas, Hairy Vetch, Kale, Oats, Temperate Grasses & Legumes.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), Suratgarh 335804, Rajasthan; Ph: 158, Gram: Prachara; Dir: J Prasad. Products: Bajra, Berseem, Cowpeas, Oats, Rape, Sorghum.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), Avadi (Alamathi), PO Cattle Farm, via Red Hills, Madras 600052; Ph: 680011, Gram: Prachara; Dir: K N Arora; Sr Tech Assts: R C Gupta, S B Sharma. Products: Bajra, Buffel grass (Molopo), Cowpea, Dinanath grass (Comman), Dolichos lab-lab, Guinea grass (Hamil),

Maize (African Tall) Peablue, Plicatulam, Rhodes grass, Sorghum (PC-23), Stylo (Verano), Schofield, Subabul (Hawaiiangiant, cunninghum), Velvet bean.

REGIONAL STATION FOR FORAGE PRODUCTION AND DEMONSTRATION (GOI), PO Netaji Subhash Sanatorium, Kalyani 741251, Dist Nadia, West Bengal; Ph: 425, 626, Gram: Growfodder; Dir: Vacant; Fodder Agronomist: B S Teotia. Products: Berseem (Mascavi), Cowpea (EF-4216), Guinea grass (Hamil), Maize (A-de-cuba & African Tall), Oat (Kent & HFO-114), Ricebran (K-1), Sorghum (MP Chari), Subabool (K-8 & K-28), Tetrakalai.

SABARMATI ASHRAM GAUSHALA (managed by the National Dairy Development Board), Bidaj Farm, PO Lali 387120, Tal Mehadabad, Dist Kheda, Gujarat; Ph: 80, 14 (Bareja); Offr Incharge: Dr N B Patel; Mgr (Dairy Husbandry): Dr T K Ghosh. Branch Off: Gandhi Ashram, Ashram Rd, Ahmedabad 380027; Ph: 407088, Gram: Gaushala. Products: Bajra, Cowpea, Guar, Hybrid Napier, Jowar, Lucerne, Maize, Oat, Para Grass, Subabul, Sudan Grass, Sunflower, Sunhemp, Teosinte.



SANJEEVANI FODDER PRODUCTION PRIVATE LIMITED, Main Off: 3-5 Ambedkar St, Devaraj Nagar Extn, Dasarathapuram, Saligramam, Madras 600093; Ph: 420690, Tlx: 041-6924 FOMS IN; Chief Exec: Dr J R Taneja; Financial Controller: I A Mathias; Admn Offr: Edward Stanley. Branches -- Bombay: Narendra Bldg, 3rd Floor, Khar Danda, -400050; Ph: 546452, Tlx: 11-71140, 11-71230 ROCK IN; Mg Dir: George Monteiro; Admn Offr: Robert Monteiro; Hyderabad: 265/3RT Sanjeeva Reddy Nagar, -500038; Ph: 260566; Project Mgr: T C Abraham; Admn Offr: P K Mathew; New Delhi: Nanda, A-11 Niti Bagh, -110049; Ph: 666984, 667082, Tlx: 31-4471 NANDA IN; Resident Mgr: T A Gangadhar; Admn Offr: Dinesh Dubey.

STATE FARMS CORPORATION OF INDIA LTD (A Govt of India Undertaking), Beej Bhawan, Pusa Complex, New Delhi 110012; Ph: 582035, 582046, 581826; Mg Dir: R C Arora, IAS; Chief (Agri): R S Singh; Mktg Mgr: D P Soni.

THAKAR DASS PRITHVI RAJ, More Ganj, Saharanpur 247001, UP; Ph: 3751, 4430.

TULSI RAM NAND LAL, 10-N Block, Sri Ganganagar 335001, Rajasthan; Ph: 708 PP;

Prop: Lalchand Arora; Tech Adviser: Dr N D Arora. Brand Name: Swastik.

UTTAR PRADESH SEEDS & TARAI DEVELOPMENT CORPORATION LTD, Pantnagar, PO Haldi, Dist Nainital; Ph: 292/26 (Rudrapur); Mg Dir: Dr R K S Chauhan.

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DHONI FARM (A unit of the Kerala Livestock Development and Milk Marketing Board Ltd), Dhoni PO, Palghat 678016; Ph: 8127 (Palghat), Gram: Dhoni Farm; Supdt: P Girijavallabhan. Products: Grasses — *Brachiaria decumbens*, *Brachiaria ruziziensis*, *Melinis minutiflora*, *Panicum maximum*, *Setaria anceps*; Legumes—*Centrosema pubescens*, *Desmodium uncinatum*, *Desmodium intortum*, *Lablab purpureus*, *Stylosanthes guianensis*, *Stylosanthes hamata*; Fodder tree — *Leucaena leucocephala*.

FODDER SEED PRODUCTION FARM, Kamki, Dist

Along, Arunachal Pradesh.

FODDER SEED PRODUCTION FARM, Barpetta, Assam.

Products: Sorghum, Maize, Cowpea, Oats.

FODDER SEED PRODUCTION FARM, Radhakishor Nagar, Agartala, Tripura.

HARYANA AGRICULTURAL UNIVERSITY, Dept of Plant Breeding, Hisar 125004; Sr Breeder (Sorghum): Dr G P Lodhi; Plant Breeder: Dr D S Jatasra.

KARNATAKA STATE SEEDS CORPORATION LTD, 15 Queen's Rd, Bangalore 560001.

MADHYA PRADESH RAJYA BEEJ EVAM FARM VIKAS NIGAM LTD, E-1/88A Arera Colony, Bhopal.

MAHARASHTRA HYBRID SEEDS COMPANY LTD, B-4 Industrial Estate, Old MIDC Area, PB No 27, Jalna 431203, Maharashtra; Ph: 2841 (4 lines), 2584, Gram: Hybridseed; Dir-Research: R R Mishra. Regd Off: 19 Rajmahal, 84 Veer Nariman Rd, Bombay 400020; Ph: 257497, Gram: Hybridseeds. Products: Sorghum sudan hybrids (MFSH-1/2/3). Brand Name: Mahyco.

ORISSA STATE SEEDS CORPORATION LTD, Asha Nivas, Lewis Rd, Bhubaneswar 751014.

RAJASTHAN STATE SEEDS CORPORATION LTD, C-11 Surya Niketan, Sawaijai Sangh Highway, Bani Park, Jaipur.

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BALJEES CATERERS PVT LTD, Fingask Estate, Shimla 171003; Ph: 2202, Gram: Baljees; Dir: Harsh Baljee, Ph off: 2313, 6313, resi: 6202. Branch: 26 The Mall, Shimla 171001. Brand Name: Baljee's.

CARYHOM ICE CREAM, 31 Khan Market, New Delhi 110003; Ph: 618413; Prop: P S Chona. Brand Name: Caryhom.

COIMBATORE DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, West Sambandam Rd, R S Puram, Coimbatore 641002; Ph: 22389, Gram: Cocomilk; Chmn: M Natarajan; Mg Dir: M Jesusavarinathan. Brand Name: CoCo.

COSMOS INDUSTRIES, M-32 Apsara Complex, Indrapuri, Bhopal; Ph: 68317, Gram: Creamie; Prop: Smt Benazir Khan; Production Mgr: Madhusudan Parikh. Brand Name: Creamie.

CREAM CENTRE ICE CREAM CO, 5 Double Storey Market, New Rajinder Nagar, New Delhi 110060; Ph: 586926; Mg Partner: Narinder Kapur, Ph (resi): 500376. Brand Name: Creamka.

CHEMICA ICE CREAMS, C-13 Sarbha Nagar, Convent Rd, Ludhiana; Ph: 20629; Mg Partner: Smt Rajni Bector.

CRETA FOOD PRODUCTS, Nilkant Nagar, Ahmedabad 380022; Ph: 51065; Mg Partner: Chandrakant Patel; Gen Mgr: Mahendra Kumar. Brand Name: Creta.

DAIRY ICECREAM & FROZEN FOODS PVT LTD, 5-9-38/1 Bashir Bagh, Hyderabad 500029; Ph: 237158, 236741, Gram: Joycream; Mg Dir: Shyam Jumani; Dir: Ashok Jumani. Brand Name: Joy & Pepcee.

DASAPRAKASH ICE CREAMS, 5 Varadarajulu Naidu St, Madras 600008; Ph: 661212, 663939, 664848; Gen Mgr: Sat Paul Malik, Ph (resi): 662155. Brand Name: Dasaprakash.

EMBASSY ICE CREAM FOODS PVT LTD, The Mall, Shimla 171001; Mg Dir: Pankaj Malhotra. Brand Name: Embassy.

ERNAKULAM REGIONAL COOPERATIVE MILK PRODUCERS' UNION LTD, Padivattom, Edappally, Cochin 682024; Ph: 4822; Mg Dir: P K Narendranathan, Ph (resi): 6725.

EVEREST ICE CREAM CO, A-19/20, BAIS Godam Indl Estate, Jaipur 302006; Ph: 77149, 67336; Mg Partner: Vinay Pardal. Brand Name: Niros.

FARINNI ICE CREAM, 18 Amratolla St, Calcutta 700001; Ph: 341939. Works: 1, Satya Dr Rd, Calcutta 700023; Ph: 455861.

FLORA ICE CREAM CO, 1 Lukerganj, Allahabad, UP; Chief Exec: K L Kanodia.

FRIENDLY ICE CREAM, 81, 3rd Main Rd, Rajaji Nagar, 3rd Town, Bangalore 560044.

FRIENDLY ICE CREAM (BOMBAY), Deonar Vill Rd, Deonar, Bombay 400088; Ph: 5519414.

FROZEN FOODS PVT LTD, MIDC Indl Estate, Shirol, Kolhapur 416122; Ph: 8077, 8189, Gram: Jumbo, Tlx: 0195-210 FF; Mg Dir: K S N Murthy. Brand Name: Jumbo.

GAYLORD
ICE CREAM

GAYLORD ICE CREAM (A Unit of G-L Hotels Ltd), 55 Rama Rd, New Delhi 110015; Ph: 530910, 537847, 537848; Chief Exec: Sanjeev Ghai; Gen Mgr: Lt-Col K S Gupta; Admn Mgr: Lt-Col M S Narag. Regd Off: 16-B Regal Bldg, Connaught Place, New Delhi 110001; Ph: 312392. Brand Name: Gaylord.

GO GO PRODUCTS CORPORATION, 19 Hewett Rd, Lucknow 226019; Ph: 31014; Prop: S P Agarwal. Brand Name: Go Go.

GOLA ENTERPRISES, B-23, G T Karnal Rd, Indl Area, Shakti Nagar, Delhi 110009; Ph: 7113177; Partners: Naresh Kapur, Arun Kapur. Brand Name: Gola 31.

HARYANA DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, SCO No 127-128, Sector 17-C, Chandigarh 160017; Ph: 40259, 26624, 21124; Mg Dir: G Parsanna Kumar, IAS. Brand Name: Vita.

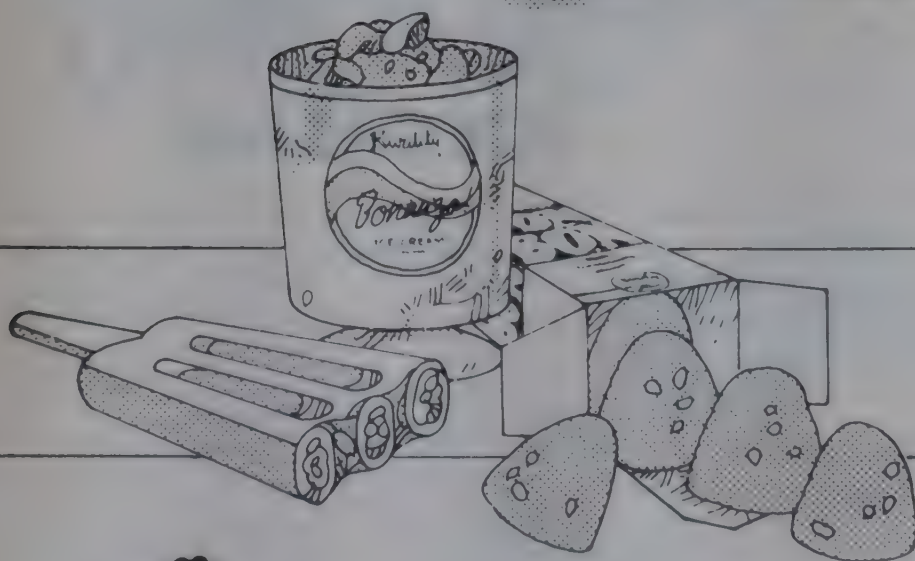
See also LATE ADDITIONS at the end of the listing

Kwality ice dreams!



**TIC-TAC
TOE**
MILK LOLLIES

Bonanza!
The carry-away Sundae



**BON
BON**
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B-12 Lawrence Road, New Delhi-110 035

HATSUN FOODS PVT LTD, 9 Tiruvottiyur Rd,
Madras 600081; Ph: 555111, 555151,
556600; Mg Dir: R G Chandramohan, Ph
(resi): 554799; Mgr: T A Adhinarayanan.
Brand Name: Arun.

HAVMOR ICE CREAM CO, Opp Krishna Cinema,
Relief Rd, Ahmedabad 380001; Ph: 337574;
Partner: Pradeep Chona, Ph (resi): 444435.
Brand Name: Havmor.

ICES PRODUCTS, 1/211 Professors Colony,
Hari Parwat, Agra 282002; Ph: 75825;
Mg Partner: O P Khanna, Ph (resi):
75365. Brand Name: Madhu.

IDEAL ICE AND COLD STORAGE CO LTD, D-3,
Road 16, MIDC, Marol, Off Mahakali Rd,
Andheri (E), Bombay 400093; Ph off:
6329349, factory: 6323005; Dir: Sudheer
Bahl, Ph (resi): 216317. Brand Name:
Taj.

IGLOO, Block No 4, Shahstri Nagar, Kadma,
Jamshedpur 831005; Ph: 26808; Mg Part-
ner: Arun Singh. Brand Name: Golden.

INDORE ICE CREAM PLANT, 245 Pankha Ratna,
Mama Parmanad Marg, Opera House, Bombay
400004; Ph: 361762; Chief Exec: Ashok
Kumar G Bhandari. Brand Name: Crown.



INDUSS ICE CREAM, 238-B Acharya J C Bose Rd,
3rd Floor, Calcutta 700020; Ph: 432812,
432576, Gram: Vishant, Tlx: 021-4373; Mg
Dir: S C Aggarwal, Ph (resi): 434059;
Works Mgr: Siddhartha Das. Brand Name:
Rollick.

J ICE CREAM (PVT) LTD, Bahadurgarh 147021,
Dist Patiala, Punjab; Ph: 72840, 73427.
Brand Name: Milkfood.

JAIN ADARSH ICE CREAM MANUFACTURING CO,
48/52 Bazargate St, Parshwakutir Coop
Housing Society Ltd, Ground Floor, Fort,
Bombay 400001; Ph: 263510, 261721; Prop:
Pankaj Mehta, Ph (resi): 2028768. Brand
Name: Jain.

JOY FROZEN FOODS PRIVATE LIMITED, 95-96
Govt Industrial Estate, Kandivli (West),
Bombay 400067; Ph: 685100, 685281, 685951,
685994, Tlx: 011-71297; Mg Dir: L C Java;

**CHOICEST FLAVOURS
FROM DAIRY TECHNOLOGIST**

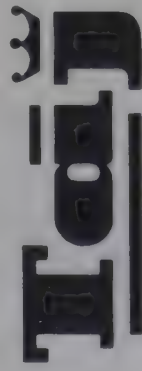


FOR FUN, FRESHNESS & FLAVOUR



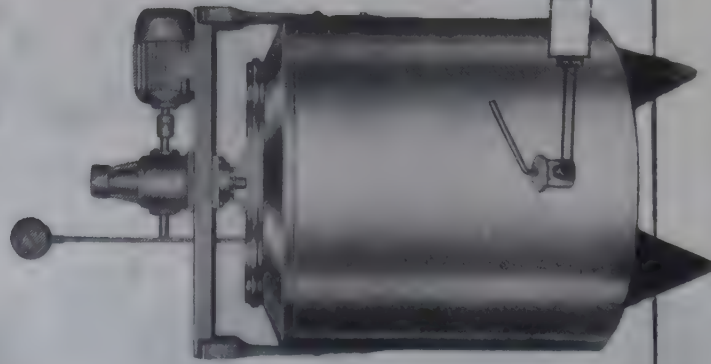
Supreme Enterprises

1. FUEL DEPOT, GOLE MARKET, NEW DELHI 110001 • PH: 343299
WORKS: 181 PHASE II, HSIDC INDUSTRIAL ESTATE, KUNDLI 131028, SONEPAT (HARYANA)

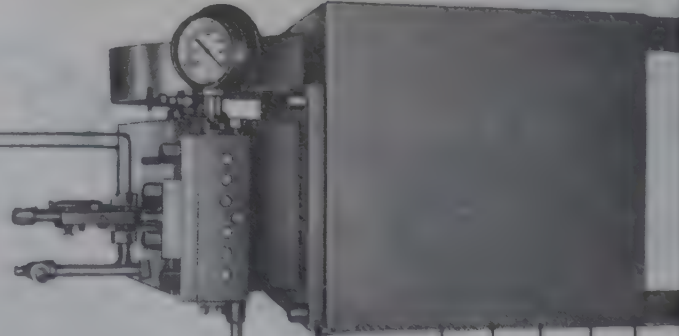


ICE CREAM & DAIRY EQUIPMENT

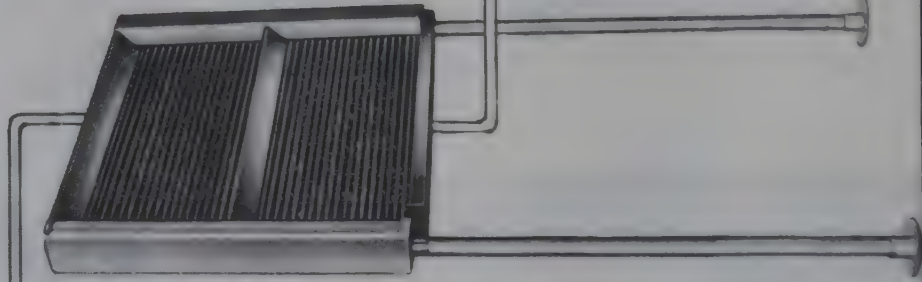
PASTEURISER VATS • HOMOGENISERS
SURFACE COOLERS • AGEING VATS
ICE CREAM FREEZERS



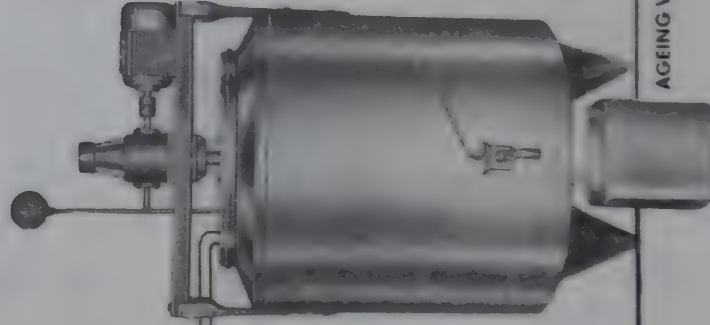
PASTEURISER VATS



HOMOGENISERS



SURFACE COOLERS



AGEING VATS



ICE CREAM FREEZERS

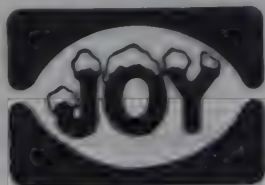


Manufactured & Marketed by:

Sigma Sales Service

3544, Nicholson Road, (Mori Gate) Delhi-110 006
Phones: 2523830 – 2928437

Admn Mgr: R G Panchmatia; Factory Mgr:
M M Java; Production Mgr: R V Mahimkar;
Engineer: B K Patel. Brand Name: Joy.



JOY ICE CREAMS (BANGALORE) PRIVATE LTD,
Main Rd, Whitefield, Bangalore 560066;
Ph: 58405, 84242, 84532/3, Gram: Joy-
creams; Mg Dir: L C Java, Ph (resi):
84321; Exec Dir: Om L Java; Quality
Controller: Jose K Joy. Brand Name: Joy.

KERALA COOPERATIVE MILK MARKETING FEDERATION LTD, 'Arkanilayam', Vazhuthacaud,
Trivandrum 695014; Ph: 66645, 63113,
Gram: Keramilk, Tlx: 357; Mg Dir: K J
Alphons, IAS. Brand Name: Milma.

KRISHNA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Milk Products Factory,
Vijayawada 520009; Ph: 75241, Gram:
Milkhouse, Tlx: 232; Gen Mgr: Dr K V
Pitchaiah. Brand Name: Vijaya.



Kwality
ICE CREAM

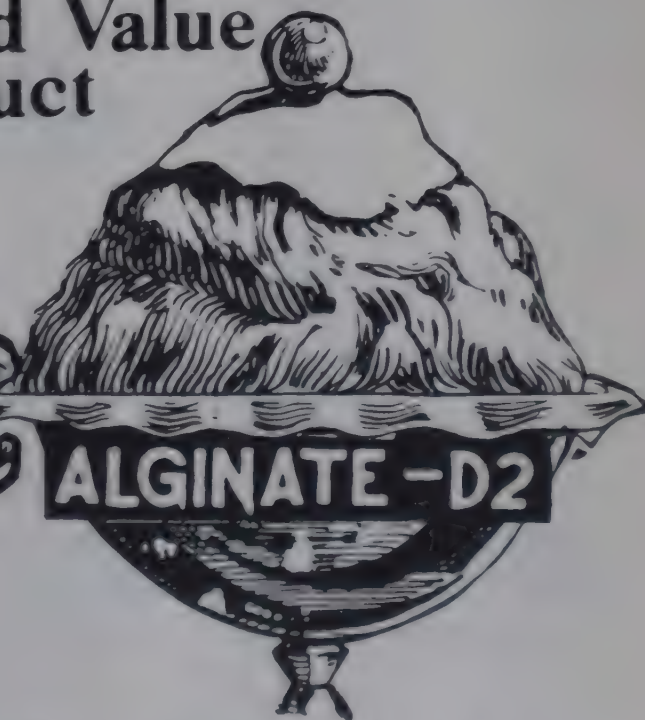
KWALITY FROZEN FOODS PVT LTD, 254-C Dr A B
Rd, Worli, Bombay 400025; Ph: 4935921,
4935932, 4935823, 4935814, Gram: Pic-
kwality, Tlx: 011-71281; Mg Dir: Ravi
Ghai; Exec Dir: N K Seth; Gen Mgr: Sunil
Pardal; Dep Gen Mgr: P H Shah. Regd
Off: 135 Netaji Subhash Rd, Bombay
400020. Brand Name: Kwality.

KWALITY ICE CREAM, 13/3 Char Bagh, Shah-
ganj, Agra 282002; Ph: 62581; Mg Part-
ner: Arvind Kapur, Ph (resi): 76176.
Brand Name: Kwality.



KWALITY ICE CREAMS (INDIA) LIMITED, 74
Diamond Harbour Rd, Calcutta 700023;
Ph: 451771 (4 lines), 491101 (4 lines),
Gram: Icecream, Tlx: 021-7834; Mg Dir:

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To Your Product**



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manufactured under 'WEST GERMAN' Technical "Know-how" in conformity with P.F.A.
Rules and already in use with a number of nationally reputed Ice Cream Manufacturers.
Enquiries solicited.

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Tansen Road, Gwalior 474002 (M.P.)

Phones: 23741, 21061 & 26443 • Gram: KOLDSTORE

Have a heart.



Stop polluting your system with all that caffeine.

Every time you meet someone, whether on business or for social occasions, you end up pouring gallons of poisonous beverages down your poor system.

Coffee can't give you what Joy Ice Creams do from milk. Joy Ice Creams bring you the cream, leaving behind the skim.

Keep yourself nourished while you relish what you eat.

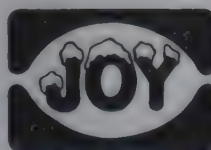
Joy Ice Creams. The creamy yummy eat

Mother Plants

1. Joy Ice Creams (B'lore) Pvt. Ltd.
Bangalore-560066.
2. Joy Frozen Foods Pvt. Ltd.
Bombay-400067.

Franchise Units

- | | |
|---|---|
| 1. Kreem Foods Pvt. Ltd.
Cochin-682 020. | 6. Southshore Ice Creams P. Ltd
Trivandrum-695 003 |
| 2. Dairy Ice Cream &
Frozen Foods Pvt. Ltd.
Hyderabad-500029. | 7. Nice Ice Creams P. Ltd
Bellary-583 104 |
| 3. Sivitha Ice Creams, Madras-600 084 | 8. Kreem Drinks Pvt. Ltd. Calicut |
| 4. Oasis Desserts & Relishes,
Mysore-570 002. | 9. Soft Foods, Goa-403 601 |
| 5. Oasis Desserts & Relishes,
Mangalore-575 008. | 10. Suvai Foods, Coimbatore-641 010 |
| | 11. Ameet Creams, Pune-411 012 |
| | 12. Coastal Dairy Foods,
Visakhapatnam-2 |



ICE CREAMS
Deliciously yours.

Prem Ghai, Ph off: 458933, resi: 299497, 294830; Gen Mgr: S Roy Chowdhury. Brand Name: Kwaliti.

KWALITY ICE CREAM, 136-140/58 Industrial Estate, Chandigarh 160002; Ph: 26027; Chief Exec: Vinod Lamba. Brand Name: Kwaliti.

KWALITY ICE CREAM CO, Rajpur Rd, Dehra Dun, UP; Prop: B K Ghai. Brand Name: Kwaliti.

KWALITY ICE CREAMS (HYDERABAD), B-3 Cooperative Indl Estate, Balanagar, Hyderabad 500037; Ph: 262753; Mg Partner: I K Khosla, Ph (resi): 70659. Brand Name: Kwaliti.

KWALITY ICE CREAM CO, Sir Gopinath Garden, Mirza Ismail Rd, Jaipur 302001; Ph: 74710; Mg Partner: Kanwal Pardal, Ph (resi): 61988; Chief Exec: Hemant Pardal. Brand Name: Kwaliti.

KWALITY ICE CREAMS (BIHAR) PVT LTD, A-1, 2nd Phase, Adityapur Indl Area, Jamshedpur 832109; Ph: 87435, 87436, Gram: Kwaliti; Mg Dir: Dev Lamba, Ph (resi): 24483, 24838; Chief Exec: Vivek Lamba. Brand Name: Kwaliti & Sub Zero.

KWALITY ICE CREAMS, Hazaratganj, Lucknow, UP; Ph: 43331, 48700; Mg Partner: A K Ghai, Ph (resi): 35445, 47238. Brand Name: Kwaliti.



KWALITY ICE CREAM COMPANY (Prop: K I C Food Products Pvt Ltd), B-12 Lawrence Rd, New Delhi 110035; Ph: PBX 7112583, 7129141; Sales: 7110342, 7121092, Gram: Lambason; Mg Dir: P L Lamba; Jt Mg Dir: Sunil Lamba; Dir, Sales: P S Bedi; Gen Mgr: S R Sablok; Prod Mgr: Subash Sehgal; Mgr, Tech Services: Col H K L Puri (retd). Head Off: 29 Hanuman Rd, Connaught Place, New Delhi 110001; Ph: 311160, 311163. Branch: 90A Industrial Area, Miller Ganj, Ludhiana 141003; Ph: 22720, 23142, 31093, Gram: Kwaliti; Chief Exec: Maj-Gen B S Ahluwalia (retd). Associate Company: Monsanto Manufacturers Pvt Ltd, A-35/1 Industrial Area, Sahibabad, UP; Ph: 866586. Brand Name: Kwaliti.

KWALITY ICE CREAMS (MADRAS) PVT LTD, 87/6 Arcot Rd, Madras 600026; Ph: 423613, factory: 428797, Gram: Icecream; Mg Dir: Rajiv Khanna, Ph (resi): 473891. Branch: Bangalore. Brand Name: Kwaliti.

With Best Compliments from



KWALITY ICE CREAMS (INDIA) LIMITED

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Calcutta 700 023

Phones: 45-1771 (4 lines), 49-1101 (4 lines)
Gram: ICECREAM • Telex: CA 7834

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Ice Cream Machinery — Industrial & Artisan Batch & Continuous Freezers
Continuous Ripple Machines & Fruit Feeders
Dosing/Filling Machines for Cups & Cones
Ice Cream Bar & Ice Lolly Plants
Softy Ice Cream Freezers
Milk Shakes & Sherbet Dispensers

●
Cocoa & Chocolate Machinery
Complete Dairy Plants (Indian)
Cheese Processing & Packaging Lines
Automatic Vacuum Can Seamers
Homogenizers, Spray Driers, Yoghurt Aerators
Laboratory Testing Instruments
Cattle Milking Machines

●
Ice Cream Cone (Plain & Sugared) Machines
Cream-filled & Chocolate-Enrobed Flat & Rolled Wafer Machines

●
Expanded (Ready-to-eat) & Extruded (Bake or Fry) Snack Lines
Breakfast Cereal Lines
Soft & Hard Confectionery Machinery
Hard & Soft & Moulded Biscuit Lines
Bread, Pizza, Naan & Papad Lines
Fruit & Vegetable Processing Equipment
Potato Chip & Chivda & Nut Processing Lines
Meat, Poultry & Fish Processing Equipment
Hotel & Fast Food Restaurant Machine

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BOMBAY 400 021, INDIA.

TELEPHONE: 22 35 43 ☐ 22 35 49 ☐ 23 03 44

TELEX: 011-4050 SIC IN ☐ 011-6970 ADL IN

LAKSHMI MILK PRODUCTS PVT LTD, 78/3 Janpath, New Delhi 110001; Ph: 310827, Gram: Madhufood, Tlx: 031-4865 HMF IN; Dirs: Berjesh K Goyal, Rajesh Goyal. Factory: A-115 DDA Shed, Okhla Indl Estate, Phase II, New Delhi. Brand Name: Uncle Bob Premium.

MADURAI DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Sathamangalam, PB No 11, Madurai 625020, Tamil Nadu; Ph: 24964, Gram: Aavin, Tlx: 210; Mg Dir: S Ramasubbaiah. Brand Name: Aavin.

MAFCO LIMITED (A Govt of Maharashtra Enterprise), Mistry Bhavan, 6th Floor, Dinshaw Vachha Rd, Bombay 400020; Ph: 222244, Gram: Corpoagrid, Tlx: 011-5149; Mg Dir: Smt R A Jadhav, IAS; Dep Gen Mgr (Dairy Mktg): Mohan Advani; Dep Gen Mgr (Prod): R R Mallya; Dep Gen Mgr (Mktg): G V Ghule. Distributors: Sole selling agents for Aarey ice cream.

MILKFOOD LIMITED, Bhandari House, 91 Nehru Place, New Delhi 110019; Ph: 6416505, 6410389, Gram: Milschen, Tlx: 61529; Mg Dir: K S Jaiswal; Exec Vice Pres: S P Khurana. Brand Name: Milkfood.

MODERN ICE CREAM FACTORY, 151 Saheed Nagar, Bhubaneswar 751007, Orissa.

NICE ICE CREAMS PVT LTD, Amala Nivas, Cantonment, Bellary 583104; Ph: 3735, 4086,

Gram: Niceice; Mg Dir: H E Dada Kalander. Brand Name: Joy.

NIRULAS CORNER HOUSE PRIVATE LIMITED, L Block, Connaught Circus, New Delhi 110001; Ph: 352419, 352465, Gram: Nirulabros, Tlx: 031-66224 NCHS IN; Mg Dir: Lalit Nirula. Brand Name: Nirulas 21.

NOIDA ICE CREAM PVT LTD, D-190 Sector 10, Noida, Dist Ghaziabad, UP; Mg Dir: R C Sharma, Ph (resi): 779702 (Delhi).

PARSI DAIRY FARM, 261-63 Shamaldas Gandhi Marg, Bombay 400002; Ph: 313633, 313634.



A GHAJI ENTERPRISE



Kwaliti
ICE CREAM

PIC (GUJARAT) PVT LTD, 19-20 Steel Mould Estate, Nagarwel Hanuman Rd, Rakhial, Ahmedabad 380023; Ph: 362355, 363933, 362451, Tlx: 012-534; Gen Mgr: Col K K Midha, Ph (resi): 464122; Production Mgr: Anand Khanolkar. Brand Name: Kwaliti.

PUNJAB STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, SCO No 3015-18, Sector 22-D, Chandigarh; Ph: 20715, 31995/6,

**BULK SUPPLIER'S
FRESH, CREAM
GHEE, BUTTER
&
MILK PRODUCTS**



CONTACT:

RUPA DAIRY (REGD.)

ARYA SAMAJ MANDIR, KRISHAN NAGAR, DELHI-110 051

PHONE : 212902, 212799

Prop: SURESH KANDHARI

KANDHAR DAIRIES

Head Office:

104, East Azad Nagar,
Delhi 110051

Phones: off: 213132
resi: 212751

City Office:

1665, Kucha Dakhni Rai,
Daryaganj

Delhi 110002
Phone: 277038

Wholesale Suppliers of :

BUTTER, CREAM
CREAM'S GHEE, MILK POWDER
&
OTHER MILK PRODUCTS

Branch Office:

United Industrial Estate,
Sitla Devi Temple Road, Mahim,
Bombay 400016
Phones: 457519, 456891

29667, Gram: Milkfed, Tlx: 0295-341; Mg Dir: A S Sodhi, IAS. PLANTS — CHANDIGARH: Milkfed Milk Plant, Industrial Area, -160002; Ph: 27853; Gen Mgr: D B Doda. Brand Name: Verka. JALANDHAR: Doaba Milk Plant, Dabwali Rd, G T Rd Bye-pass; Ph: 73546; Gen Mgr: Amrik Singh. Brand Name: Amber.

RITA ICE CREAM, Sardar Patel Rd, Civil Lines, Allahabad, UP.

RITA ICE CREAM CO, C-30/37-A Maldahiya, Varanasi, UP.

SIVITHA ICE CREAMS, 92 Poonamallee High Rd, Flowers Rd PO, Madras 600084; Ph: 663384; Mg Partner: C Shanmuganathan, Ph (resi): 445291. Brand Name: Joy.

SUB ZERO ICE CREAMS (KARNATAKA) PVT LTD, 108 K H Rd, Bangalore 560027; Ph: 226229; Mg Dir: Rajiv Khanna; Mgr: M V G Rao. Brand Name: Sub Zero.



SUPREME ENTERPRISES, 1 Fuel Depot, Gole Market, New Delhi 110001; Ph: 343299; Prop: Bharat Bhushan. Factory: 181, Phase II, Industrial Estate, Kundli 131028, Dist Sonapat, Haryana. Brand Name: Freezee.

TAMILNADU COOPERATIVE MILK PRODUCERS' FEDERATION LTD, Aavin Illam, Madhavaram Milk Colony, Madras 600051; Ph: 575531-35, Gram: Aavin, Tlx: 041-217; Mg Dir: V Karuppan, IAS. Plant: Ayyanavaram. Brand Name: Aavin.

TULIKA'S ICE CREAMS PVT LTD, Opp Russel St PO, 41 Chowringhee Rd, Calcutta 700071; Ph: 290375, Gram: Khongea; Dirs: A Pabrai, Sudhir Prakari, B M Katyal. Brand Name: Tulikas.

V B C FOODS PRIVATE LIMITED, Tadigadapa, Vijayawada 521137, AP; Ph: 58351-2, Gram: Kwaliti, Tlx: c/o 155-6206; Mg Dir: K Satyanarayana; Exec Dir: M V S Choudary; Production Mgr: Sharlin U Thayil. Regd Off: Plot No 1159, Jubilee Hills Coop House Bldg Society, Hyderabad 500034; Ph: 37913. Brand Name: Kwaliti.

VADILAL
ICE CREAM

VADILAL ICE CREAM PRIVATE LIMITED, Dudheshwar Rd, Ahmedabad 380004; Ph: 386865, 332615 (4 lines), Gram: Vadacrim; Mg Dirs: Laxman R Gandhi, Ph (resi): 441277, Shailesh R Gandhi, Rajesh Gandhi. Distributor: Vadilal Marketing Private Limited. Brand Name: Vadilal.

VASANT ICE CREAM COMPANY, Krishna Udyog Bhavan, 15 Nariman Rd, Near Bengal Chemicals, Prabhadevi, Bombay 400025; Ph: 4220938/68; Mg Partner: Ajit Narang, Ph (resi): 537958. Brand Name: Trupti.

VIMAL ICE CREAM, 5/12 Bombay-Poona Rd, Kirkee, Pune 411003; Chief Exec: Pramod Lokre.

VINGO ICE CREAM, C-64 Rajan Babu Rd, Adarsh Nagar, Delhi 110033; Ph: 7115152, 7118767; Partners: R K Narula, K D Gulati. Brand Name: Vingo.

Late Additions

DAIRY TOPS, J/177 Pimpri-Chinchwad Industrial Area, Pune 411026; Ph: 86082, 87004; Mg Dir: N K Seth, Ph (Bombay resi): 4932423; Gen Mgr: N G Krishnan. Brand Name: Kwaliti.

MAHARASHTRA DAIRY PRODUCTS MANUFACTURING CO PVT LTD, D2/11 Corlim Industrial Area, Corlim Ilhas, Goa; Ph: 18; Dir: N V Desai. Brand Name: Kwaliti.

Using the Yearbook

You will be surprised at the many, varied ways in which this YEARBOOK can be used by you. A handy databook-cum-directory, it is classified conveniently for quick, easy reference.

Looking for an address, or a phone number? Or perhaps a farm, a feed company, an equipment manufacturer, a pharmaceutical company, a marketing agency, or a government office? Check the table of contents in the beginning pages or the Advertiser's Index. Also, consult the Buyer's Guide.

You are now referring to the only DIRECTORY-cum-DATABOOK-cum-BUYER'S GUIDE of products services and equipment, compiled exclusively for use of India's livestock industry.



HAUER TRADING CO.

DAIRY DIVISION

SVN House, 90, C.P. Ramaswamy Aiyar Road
Alwarpet, Madras - 600 018.
Phone: 71795 Gram: POTENTIAL Telex: 041-7385

The House for Quality DAIRY PRODUCTS

- ★ Milk Powder
(Skimmed/Whole)
- ★ Condensed Milk
(Skimmed/Fullcream)

- ★ Butter
- ★ Ghee
- ★ Cheese

Both Bulk and Consumer Packings Handled

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Aplin & Barrett Ltd., England**

Manufacturers of the Food Preservative
NISAPLIN (Commercial Nisin[†])

NISAPLIN brand nisin is highly effective in the control of
bacterial spoilage in heat processed dairy products/canned
foods and significantly enhances their shelf life.

Other Offices:

CALCUTTA: Ph: 232735
NEW DELHI: Ph: 523581

BOMBAY: Ph: 8129867
PORT BLAIR: Ph: 3309

[†] Currently permitted under the PFA Rules for use in cheese. Approval for use in other products awaited.

Milk Marketing

Marketing organizations, handling fluid milk in the public, cooperative and private sectors, are listed below, statewide. Also included are Government Milk Schemes and State Government dairy agencies. Many of them also have fluid milk plants and product factories which are listed separately under "Milk Plants". Organizations manufacturing and marketing of dairy products are listed separately under "Dairy Product Manufacturers".

Andhra Pradesh

ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LIMITED, THE, Lalapet, Hyderabad 500017; Ph: 71851 (9 lines), Gram: Apdairy, Tlx: 0155-545.

Mg Dir: K Sadasiva Rao, IPS, Ph off: 71233, resi: 263889

Dir (Ops) & I/c Dir (Civil): K Ramakrishna Rao, Ph off: 71771, resi: 71227

Dir (Proc & Inputs): Dr V Jaswantha Rao, Ph off: 71671, resi: 71564

Dir (Finance & Accts): V Purnachandra Rao, Ph off: 71207, resi: 71307

Jt Registrar (Audit Offr): D V Badram, Ph off: 71604, resi: 61193

Chief Quality Control: Dr K Madhava Rao, Ph off: 71559, resi: 71188

Sr Dairy Engr-I: N A Narsimhlu, Ph (resi): 77030

Sr Dairy Engr-II: M B Mohan Reddy, Ph (resi): 68420

Jt Dir (Mktg): Dr V Raghava Rao, Ph off: 71014, resi: 71839

Jt Dir (Plg): Dr R Janardhana Rao, Ph (resi): 71702

Jt Dir (Trg): Dr K Muralidhar Rao, Ph (resi): 71851 Ext 294

Jt Dir (Coord): Dr B Purnachandra Rao, Ph off: 71741, resi: 45404

Jt Dir (Medak-Nizamabad Milkshed): Dr P Pratap Reddy, H No 1-2-66, Opp State Bank of Hyderabad, Nizamabad 503002; Ph: 1341.

Jt Dir (Nalgonda-Ranga Reddy Milkshed): Dr M Waman Rao, Lalapet, Hyderabad 500017; Ph off: 71741, residence: 68583.

Dep Dir (Warangal-Khammam Milkshed): V Nag-eswara Rao, H No 1-8-150, R P Rd, Hanam-konda 506001, Warangal Dist; Ph off: 7132, resi: 7122.

Brand Name: Vijaya.

Assam

DAIRY DEVELOPMENT DEPARTMENT, Government of Assam, Khanapara, Guwahati 781022; Ph: 87117.

Dir: Dr Abdus Sattar, Ph off: 87117, resi: 23774.

Bihar



COMPFED

BIHAR STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, B-9 Srikrishnapuri, Patna 800001; Ph: 24716, Gram: Sudha, Tlx: 022-215.

Mg Dir: G S Kang, IAS, Ph off: 24716, resi: 21042

Mgr (Projects): R V Singh, Ph off: 21505

Mgr (Proc): Dr P K Chowdhury

Admn Offr: Anjani Kumar

Offr Incharge (Projects): R D Thakur

Purchase Supdt: R Verma.

Brand Name: Sudha.

See also LATE ADDITIONS at the end of the listing

When milk started flowing in Gujarat

Way back in 1973, 1025 persons were organised by GDDC forming cooperatives in Gujarat. Milk producers today number more than 95,000, associated with more than 1,500 cooperative societies, where none ever existed. Prodigious white revolution was the outcome! A decade's constant efforts handsomely paid off!... Speaks of volumes for the splendid cooperation GDDC could muster in the far flung areas, now transformed into milk producing cooperatives.... 10 years is a flicker of time in a nation's life. Much greater heights must be measured to achieve not only self-sufficiency in milk production, but bring plenty and prosperity. More cooperative societies will have to be organised. To that end shall GDDC bend all efforts. So that you and the coming generation will have plenty of milk.... Our labs burn a lot of midnight oil in research, to make sure the milk and milk products come to you in the purest form only.

GDDC

From penury to prosperity-a great leap forward

Gujarat Dairy Development Corporation Limited (A Govt. of Gujarat Undertaking) Sector 16, Gandhinagar 382 016.



PATNA DAIRY PROJECT (Govt of Bihar Project Managed by NDDB), B-9 Srikrishnapuri, Patna 800001; Ph: 22685, 26347, Gram: Dairyboard, Tlx: 022-215.

Dir: Dr Jagjit S Punjraht
See: Milk Plants Listing.

Delhi

ANAND DAIRES LIMITED, A-84 Ashok Vihar, Phase III, Delhi 110052; Ph: 748784.
Chmn & Mg Dir: Anand Dev Sharma
Plant: Karnal (Haryana).

DELHI MILK SCHEME, Government of India, West Patel Nagar, New Delhi 110008; Ph: 588218, Gram: Delmilk.

Chmn: Dr Chhatra Sal Singh, IAS, Ph: 585109
Dep Gen Mgr (Tech): M N Khan
Mgr (Sales Promotion): V B Saran
Mgr (Distribution): K D P Sinha
Brand Name: DMS.
See: Milk Plants Listing.

MOTHER DAIRY (A Govt of India Dairy Managed by NDDB), Patparganj, Delhi 110092; Ph: 2241991, Gram: Motherdairy.
Gen Mgr: Deepak Tikku, Ph off: 2242158, 601480, resi: 6439577
Dep Gen Mgr (Comml & Admn): S K Das, Ph: 2241440
See: Milk Plants Listing.

NANAK DAIRY PLANT, A-10/6 Vasant Vihar, New Delhi 110057; Ph: 672898.
Prop: Nanak Singh, Ph (resi): 673530
Plant: Hodal (Haryana).
Sole Distributors: Milk Pack Enterprises, G-44 Industrial Area, Lawrence Rd, Delhi 110035; Ph: 7128048; Mg Partner: Dr R P Singh, Ph (resi): 593265.
Brand Name: Nanak.

Goa

GOA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LIMITED, Curti, Ponda, Goa 403401; Ph off: 247, dairy: 92, Gram: Goadairy.
Acting Mg Dir: P K Gbate

Addl Mgr: S G Naik
Shift Supdts: V C Panvelker, R D Revonker, P V F Dessai
Milk Proc Offr: D P Bhatikar.

Gujarat



GUJARAT COOPERATIVE MILK MARKETING FEDERATION LIMITED (GCMMF), Amul Dairy Rd, Anand 388001; Ph: 3201-4, 3209, Gram: Milkfed, Tlx: 0172-220.

Chmn: Dr V Kurien, Ph off: 3400, resi: 3000
Mg Dir: J J Baxi, Ph off: 3400, resi: 3888
Gen Mgr: N H Vyas, Ph off: 3201, resi: 3872
Asst Gen Mgr (Quality Control): J M Contractor, Ph off: 3209, resi: 3382
Asst Gen Mgr (Tech & Proj): Dr H B Buch, Ph (resi): 3873

Group Product Mgr: Shyam B Laddha

Branches — **Ahmedabad**: Opp Old Pilot Dairy, Kankaria, -380022; Ph: 52101/2/3, 54840, Gram: Milkfed, Tlx: 0121-417; Mgr (Sales): B N Chatterjee; **Bombay**: Rampart House, 4th Floor, Rampart Row, Fort, -400023; Ph: 244220, 244336, 231866, Gram: Milkfed-bom, Tlx: 011-2906; Dep Mgr (Sales): V J Matthai; **Calcutta**: Rajkamal Bldg, 13 Camac St, -700017; Ph: 434320, 434370, Gram: Milkofed, Tlx: 021-3384; Mgr (Sales): P K Chatterjee; **Madras**: 13 Nungambakkam High Rd, -600034; Ph: 470752, 472820, Gram: Milkfed, Tlx: 041-6181; Mgr (Sales): N Natarajan; **New Delhi**: 1210 New Delhi House, 27 Barakhamba Rd, -110001; Ph: 3315745, 3315752, 3313462, Gram: Milkfed, Tlx: 031-3200; Mgr (Sales): R C Agarwal.

Depots — **Bangalore**: Hitananda-II, 26/1 Lavelle Rd, -560001; Ph: 563190, Gram: Milkfed, Tlx: 0845-248; Sales Supdt: N Patanjali; **Cochin**: 38/123 Narakathara Rd, -682035; Ph: 368701, Gram: Milkfed, Tlx: 0885-631; Asst Mgr (Sales): K S K Murthy; **Cuttack**: Kanika Chowk, Tulsipur, -753008; Ph: 23112, Gram: Milkfed, Tlx: 0676-208; Asst Mgr (Sales): S Panigrahi; **Guwahati**: G S Rd, Bhangagar, -781005; Gram: Milkfed, Tlx: 0235-214; Dep Mgr (Sales):

Nazmul Huq; Hyderabad: 5-9-24/68 Hill Fort Area, -500463; Ph: 236378, Gram: Milkfed, Tlx: 0155-6374; Dep Mgr (Sales): N A Williams; Indore: 5 PWD Workshop Rd, Opp Satprachar Press, -452001; Ph: 21104, Gram: Milkfed, Tlx: 0735-343; Asst Mgr (Sales): M G Shaikh; Jaipur: D-148/A-2 Durga Marg, Bani Park, -302006; Ph: 66589, Gram: Milkofed, Tlx: 036-375; Sr Sales Offr: Dilip Kumar; Kanpur: 16/72 Civil Lines, -208001; Ph: 211009, 211604, Gram: Milkofed, Tlx: 0325-434; Sr Sales Offr: Arvind Thakkar; Patna: 'Ashok Vanam', C-1 Srikrishna-puri, -800001; Ph: 22763, 32509, Gram: Milkfed, Tlx: 022-273.

Brand Names: Amul, Sagar.



GUJARAT DAIRY DEVELOPMENT CORPORATION LTD,
Patnagar Yojana Bhavan, Sector 16,
Gandhinagar 382016; Ph: 22881, 22883,
22802, Gram: Dairycorp.

Chmn: Jivabhai Keshwala

Mg Dir: C R Biswas, IAS, Ph off: 22072,
resi: 20982

Jt Gen Mgr (PP&E): K S Rao, Ph off: 22419,
resi: 4377

Sr Mgr (Spl Prog): M C Patel,
Ph (resi): 3001

Sr Mgr (Quality Control): B N Khunti,
Ph: 54645 (Ahmedabad)

Dep Gen Mgr (P&IR): S K Desai,
Ph (resi): 445325 (Ahmedabad)

Sr Mgr (P&I): Dr B A Odedra

Sr Mgr (Accounts): J A Shah, Ph: 22230

Mgr (M&D): P Davar

Mgr (MIS & Coord): N R Bhalja

Field Offices — Ahmedabad: Abad Dairy,
Kankaria Rd, -380022; Ph: 54647; Gen Mgr:
A K Datta, Ph off: 52863, resi: 442001;
Amreli: Chalala Dairy, Chalala 364630;
Ph: 82; Mgr: Y S Malek, Ph (resi): 68;
Bhavnagar: Bhavnagar Dairy, Gaurishanker
Lake Rd, -364002; Ph: 27886; Sr Mgr: R K
Kathpalia, Ph (resi): 27885; Gandhinagar:
Gandhinagar Dairy, 'K' Road, Sector 25,
-382025; Sr Mgr: M C Patel, Ph (resi):
3001; Jamnagar: Jamnagar Dairy, Sarusec-
tion Rd, -361001; Ph: 74866; Mgr I/c: V
P Khamar, Ph (resi): 74431; Junagadh:

Junagadh Dairy, Zafar Maidan, -362001;
Ph: 326; Mgr: G A Patel, Ph (resi):
20410; Kutch: Kutch Dairy, Madhapar,
Bhuj 370020; Ph: 1555; Mgr: Devang Mehta,
Ph (resi): 1788; Rajkot: Rajkot Dairy,
Dudhsagar Marg, -360003; Ph: 87353; Gen
Mgr: G R Ralhan, Ph (resi): 87164;
Surendranagar: Surendranagar Dairy, Wadh-
wan Rd, Wadhwan 363030; Ph: 1788; Sr Mgr:
A M Bhayla, Ph (resi): 1899.

Haryana



HARYANA DAIRY DEVELOPMENT COOPERATIVE FEDERATION LIMITED, SCO No 127-128, Sector 17-C,
Chandigarh 160017; Ph: 40259, 26624,
20418, 21124, 24335, 26713, Gram:
Vitality.

Chmn: M C Gupta, IAS, Ph off: 40452,
resi: 43635

Mg Dir: G Prasanna Kumar, IAS, Ph off: 20713,
resi: 84826

Chief Admn Offr: P P Singh Sawhney,
Ph off: 24335, resi: 41659

Dir (Production): B Vishwanathan,
Ph off: 20418, resi: 41022

Dir (Proc & Input): A K Chopra,
Ph off: 21124, resi: 20496

Dir (Mktg): S R Tayal, Ph off: 26624

Gen Mgr (Tech): Niranjan Das, Ph off: 26173

Gen Mgr (P): O P S Saharan, Ph off: 26427

Mgr (MIS): Ramu Hooda, Ph off: 21124

Dep Mgr (Finance): A K Kak, Ph off: 26173

Dep Mgr (Accounts): J R Kaushal,
Ph off: 42167, resi: 20622

Delhi Office — E-13 Jhandewalan Extn, New
Delhi 110055; Ph: 524932, 517531-32.

Brand Name: Vita.

MILK COMMISSIONER'S OFFICE, Kothi No 692,
Sector 6, Panchkula 134109; Ph: 84693.
Milk Commissr: J L Bhutani
Project Offr: Dr Inder Prakash Arora
See: State Govt Listing.

A House of Quality Milk and Milk Products since 1952



**Founded by late Shri Ratilal B. Mehta
Prop.: PANKAJ MEHTA**

Jain Adarsh Dugdhalay Jain Adarsh Ice Cream Mfg. Co.

Parshwakutir Co-op. Housing Society Ltd., Ground Floor,
48/52, Bazargate Street, Fort,
Bombay 400001.

Phones: 263510 & 261721

SHRIKHAND

Delicious saffron coloured,
pure shrikhand with real Elaichi
having unique taste of home made shrikhand

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A Speciality Product
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ICE CREAMS

Splendid taste & dreamy flavours.
The choice of many...

KULFIS

The traditional Indian ice creams
perfected for your taste, flavours & enjoyment





Hand in hand we make the white revolution

Milma has organised thousands of dairy farmers into milk producers co-operatives.

Their untiring efforts and Milma's impeccable co-ordination make white revolution a reality in Kerala.

To the people of Kerala, Milma is their Kamadhenu. Milma gives them dairy products of high nutritional value and taste – pasteurised milk, butter, ghee, ice cream and flavoured milk.

Flavoured milk drinks in aseptic Tetra brick packs and protein rich milk powder are expected to hit the market soon.



milma



**Kerala Co-operative
Milk Marketing Federation Ltd.**

Himachal Pradesh

HIMACHAL PRADESH STATE COOPERATIVE MILK PRODUCERS' FEDERATION LIMITED, THE, Totu, Shimla 171011; Ph: 6461, Gram: Hpmilkfed.

Mg Dir: I D Moudgil, Ph (resi): 6817

Sr Mgr (PP&M): S S Sood

Sr Mgr (P&I): A N Gupta

Mgr (Accts & Admn): C R Garg

I D O: V S Sidhu

Asst Mgrs: E B Patil, S N Sharma, P R Gupta, K L Sharma

Units/Sub Units — Mandi: Chakkar; Ph: 2791;

Proj Coordinator: Anil Sanyal; Nahan:

Dist Sirmaur; Ph: 182; Asst Mgr: R K

Mudgil; Shimla: Totu; Ph: 3248; Factory

Mgr: N L Sharma; Solan: Ph: 946; Asst

Mgr: A K Dhawan.

Jammu & Kashmir

JAMMU COOPERATIVE MILK FEDERATION LIMITED, Jammu Cantt, Jammu.

Mg Dir: Dr C D Vir, Ph off: 41376, resi: 44149.

KASHMIR VALLEY MILK PRODUCERS COOPERATIVE FEDERATION LTD, PO Chashme-Shahi, Bran Tehsil, Srinagar.

Mg Dir: A L Bhutt.

Karnataka



KARNATAKA COOPERATIVE MILK PRODUCERS FEDERATION LIMITED, THE, No 22 Poornima Bldgs, J C Rd, 1st Cross, Bangalore 560027; Ph: 222691 (6 lines), Gram: Nandini.

Mg Dir: C Muniswamy, IAS, Ph off: 227524, resi: 564239

Dir (Admn): K A S Siddaiah, Ph off: 228614, resi: 359345

Dir (Finance): T S Rama Swamy, Ph off: 220408, resi: 355464

Dir (Procurement): M S Mudnur, Ph off: 221115, resi: 354230

Dir (Marketing): C N Manchegowda, Ph off: 225015, resi: 359084

Dir (AH): Dr H Chennegowda, Ph off: 228040, resi: 360752

Dir (Engineering): B T Kaiwar, Ph off: 221323, resi: 621910

Dir (Purchase): M H Walters, Ph off: 220805, resi: 561042

Procurement & Input Wings — Bijapur: MIG 31, Hudco Colony, -586101; Ph: 949; Mgr:

Dr Nagaraj, Ph: 1586; Raichur/Bellary:

H No 3/18, 1st Cross, Gandhinagar, Bel-

lary; Ph: 4419; Mgr: Dr Ramakrishna;

Shimoga: Shimoga Dairy Premises, Machen-

hally, Nidige Post, -577222; Ph: 2670;

Mgr: Dr Narasimhaiah.

Brand Name: Nandini.

Kerala

DIRECTORATE OF DAIRY DEVELOPMENT, Pattom, Trivandrum 695004; Ph: 75814.

Dir: P G Ramachandran Pillai, Ph off: 75749, resi: 8161

Jt Dirs: E H Nathan, N Appukuttan Nair, Ph: 75799

Dep Dir (Livestock): E A Paul

Dep Dir (General): K Chellappan

Dep Dir (Extn): K Radhakrishnan

See: State Government Listing.

KERALA COOPERATIVE MILK MARKETING FEDERATION LIMITED, 'Arkanilayam', Vazhuthacaud, Trivandrum 695014; Ph: 66645, 63113, 66479, Gram: Keramilk, Tlx: 357.

Chmn: Prayar Gopalakrishnan, Ph off: 64181, resi: 45 (Oachira)

Mg Dir: K J Alphons, IAS, Ph off: 67942, 61495, resi: 60933

Programme Coordinator: V S Hebbar, Ph off: 66645, resi: 63427

Sr Mgr (Projects): T S Krishnaswamy, Ph off: 66645, resi: 76926

Sr Mgr (Mktg): K P Rajendran, Ph off: 63113, resi: 76578

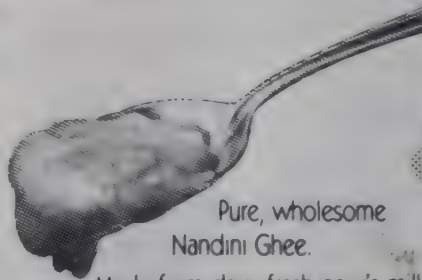
Sr Mgr (Maintenance): P K Abdul Azzez, Ph off: 66645, resi: 72123

Mgr (Accounts): N S Varadarajan, Ph off: 63113, resi: 76547

Mgr (Purchase): P R Sanjeev, Ph off: 63113, resi: 64054

Rick, tasty, dairy-fresh...

Only **Nandini GHEE**
gives you that natural goodness!



Pure, wholesome
Nandini Ghee.

Made from dairy-fresh cow's milk and
packed in sealed tamper-proof bottles and
sachets, Nandini Ghee has the very colour,
granular texture and flavour of home-made ghee.

The aroma! The taste! The goodness!
Yes, Nandini Ghee has it all.

For those of you who would like to make your own
ghee, there's creamy Nandini Butter

*Nandini Ghee
-the purest,
healthiest best
for your family*



Also
available in
hygienically
sealed
500 gm.
sachets

KMF

**KARNATAKA CO-OPERATIVE
MILK PRODUCERS' FEDERATION LIMITED**

No. 22, "Poomima Building",
J.C. Road, 1st Cross, Bangalore-560027

Mgr (MIS): Sugunan K Das, Ph: 66479
 Mgr (Proj): N Mylsamy, Ph off: 66479,
 resi: 61502
 Mgr (Personnel): P Sivasankara Pillai,
 Ph off: 66479, resi: 61822
 PS to Mg Dir: C V G Menon, Ph (resi): 79548
Brand Name: Milma.

• • • • •
 KERALA LIVESTOCK DEVELOPMENT & MILK MARKET-
 ING BOARD LIMITED, 9/1148 Mani Bhavan,
 Sasthamangalam, Trivandrum 695010; Ph:
 64954, 64907, 64232, Gram: Pasupal.
 Chmn: N Kaleeswaran, IAS, Agricultural Pro-
 duction Commissr, Ph off: 67285, resi:
 78808
 Mg Dir: K J Alphons, IAS, Ph off: 62610,
 resi: 60933
 Exec (Gen Plg): Dr T K Jose, Ph off: 64598,
 resi: 73352
 Exec (AH): Dr T C Mathew, Ph off: 64954
 Accts Mgr: C P Jacob, Ph off: 64954,
 resi: 62392
 Fodder Dev Offr: G Gopinatha Pillai,
 Ph off: 64232, resi: 63528
 Chief Project Adviser, Indo Swiss Project:
 F Schneider, Ph off: 64907, resi: 64207
 Swiss Fodder Expert: F Von Sury, Ph off:
 64907, resi: 65103
 Asst Personnel Mgr: A T Joseph, Ph off:
 64954, resi: 65769
 Zonal Office (South): Thodupuzha 685594;
 Ph: 2452; Mgr: T V Joseph.
 Zonal Office (North): Chalapuram, Calicut
 673002; Ph: 64613; Mgr: H Mariappan,
 Ph (resi): 74179.

Madhya Pradesh

MADHYA PRADESH DUGDHA MAHASANGH (SAHAKARI)
 MARYADIT, Guru Teg Bahadur Complex,
 Roshanpura, Bhopal 462003; Ph: 61365/6,
 Gram: Dugdhanigam, Tlx: 0705-237.
 Chmn: Mahendre Singh
 Mg Dir: Jaimini Sharma, IAS, Ph: 62694
 Dir (M&P): B K Tankha, Ph: 65729, resi: 66592
 Dir (CTI): Dr M Mishra
 Jt Dirs — M&P: B P Pethiya, H S Sullere;
 CTI: Dr J M Kale; Forage Prod: Dr C M
 Nayak; Engg: K A Abraham; Coord: Dr S
 Ramathan; Finance: L P Verma; Mktg &
 Mass Media: H P Chouhan
 Mgr (Quality Control): D K Rai
 Sr Proj Execs — Mktg: Anand Pandeya; Admn:
 P K Sur; M&P: A R Sumant
Brand Name: Sneha.

Maharashtra

GREATER BOMBAY MILK SCHEME, Abdul Gafarkhan
 Rd, Worli Seaface, Worli, Bombay 400018;
 Ph: 4937179, Gram: Milk.
 Gen Mgr: N D Kotnis, Ph (resi): 6343540
 Controller (Milk Proc & Distribution): M M
 Limaye, Ph off: 4938220, resi: 4922358
 Controller (Milk Transport Services): S R
 Kotnis, Ph off: 4934316, resi: 4920293
Brand Name: Aarey.

• • • • •
 OFFICE OF THE DAIRY DEVELOPMENT COMMISSIONER,
 Maharashtra State, New Administrative Bldg.
 Abdul Gafarkhan Rd, Worli Seaface, Bombay
 400018; Ph: 4937087, 4935929, 4939013,
 Gram: Dairy Dev Comm.
 Dairy Dev Commissr: Navin Kumar, IAS.
 Ph off: 4931571, resi: 2025930
 Addl Dairy Dev Commissr: N N Patil,
 Ph off: 4937010, resi: 8281803
 Dep Dairy Dev Commissr (P&D): S K Tinaikar,
 Ph off: 4937064/87, resi: 8125781
 Dep Dairy Dev Commissr (P&P): R J Nerurkar,
 Ph off: 4937064/87, resi: 687209 637209
See: State Government and Milk Plants Listing.



MAFCO LIMITED, Mistry Bhavan, 6th Floor,
 Dinshaw Vachha Rd, Bombay 400020; Ph:
 222244, Gram: Corpoagrid, Tlx: 011-5149.
 Mg Dir: Mrs Rani A Jadhav, IAS; Ph off:
 220443, resi: 2026156
 I/c Dep Gen Mgr (Dairy Mktg): Mohan Advani,
 Ph (resi): 2021056
 Regional Offices — Bombay: (i) Dairy Market-
 ing, c/o Worli Dairy Campus, Worli Sea
 Face, -400018; Ph: 4935446, 4935011; Mgr
 (Dairy Sales): S M Shringare; (ii) Bombay
 Deep Freeze, D N Rd, Crawford Market,
 -400001; Ph: 4150405; Sr Mgr (Sales): S R
 Tungikar; (iii) Mafco Factory, Behind
 Sanjay Gandhi Park, Borivli (E), -400066;
 Ph: 662352, 662653; Factory Mgr: R M
 Patwardhan; Sales Mgr (I/c): K K Ganguli;
 (iv) Mafco Factory, Post Turbhe-Vashi,
 New Bombay 400703; Ph: 922/682554,

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Unhygienic and sub-standard
milk does more harm than good.
Do not buy milk from unreliable
sources.

Go for the seal of purity. Milkfed
supplies pasteurised, standard and
high fat milk. In sterilized bottles
and pouches.

QUALITY PRODUCT OF



MILKFED. Your guarantee of
healthy milk.

682720; Factory Mgr: S T Karve; Nagpur:
Block No 101, Phule Market; Ph: 46026,
47442; Area Mgr: S R Tawale; Nanded:
Itwara, PB No 55, -431601; Ph: 2086;
Factory Mgr: S D Vaidya; Pune: Gokhale
Nagar, -411016; Ph: 59997, 59278; Fac-
tory Mgr: N K Marwah; Mgr (Sales): S Z
Gadwe; Koregaon: Rehmatpur Rd, Dist
Satara 415501; Factory Mgr: S V Phadnis;
Ph: 289; New Delhi: Junction of Bhagat
Singh Marg, Opp Bangla Sweet House, Gole
Market, -110001; Branch Mgr: D R Naik.

Brand Names: Aarey (Ghee, Butter, White But-
ter, Skimmed Milk Powder, Shrikhand,
Cheese, Paneer, Ice Cream), Energee
(Flavoured Milk).



MAHARASHTRA RAJYA SAHAKARI DUDH MAHASANGH
MARYADIT, N K M International House,
West Wing, 3rd Floor, 178 Backbay Recla-
mation, Babubhai M Chinai Marg, Bombay
400020; Ph: 2024529, Gram: Cofedmilk.
Chmn: Bala Saheb Jadhav, Minister of State
for Dairy Dev, AH & Fisheries
Mg Dir: R G Bansod, IAS, Ph off: 2024529,
dairy: 687596
Dir (T & MD): V G Tulpule, Ph off: 687577,
687591
Mgr (FO&AH): Dr M L Naware, Ph off: 2024529
Mgr (Mktg): S B Talekar, Ph off: 687577,
resi: 687595
Mgr (Finance): K R Shetty
Asst Mgr (Purchase): S G Pawar
Asst Mgrs (P&I): T M Kawtikar, S G Jadhav,
R M Choudhari
Asst Mgr (Trg): R V Naik
Gen Mgr, Mahanand Dairy, Bombay: S A Sawant,
Ph off: 687580, resi: 687589
Brand Name: Mahanand.

PARSI DAIRY FARM, 261-63 Princess St, Bom-
bay 400002; Ph: 313633, 313634.
Mg Partners: Dinshaw Nariman, Merwan Nari-
man, Naval Nariman.

Orissa

ORISSA STATE COOPERATIVE MILK PRODUCERS'
FEDERATION LIMITED, THE, D-2 Sahid Nagar,
Bhubaneswar 751007; Ph: 54573, 52273,
Gram: Omfed, Tlx: 675-218.
Chmn: Sudhansu Mohan Patnaik, Retd IAS,
Ph off: 54694, resi: 54676
Mg Dir: Ujal Singh Bhatia, IAS,
Ph off: 55206, resi: 54665
Mgr (Proc & Input): Dr G K Padhy
Mgr (Dairy): S C Kar, Ph off: 55351,
resi: 53909.

Pondicherry

PONDICHERY COOPERATIVE MILK PRODUCERS'
UNION LIMITED, THE, Pondicherry Dairy
Plant, Kumarnpet, Muthirapalayam,
Pondicherry 605010; Ph: 4505, Gram:
Comilk.
Chmn: T Kaliaperumal
Mg Dir: K Parasuraman, Ph off: 5750,
resi: 5901.

Punjab

DAIRY DEVELOPMENT DEPARTMENT. Show Room No
7-A, Sector 7-C Madhya Marg, Chandigarh
160019; Ph: 23228.
Milk Commissr: B M Mahajan, Ph off: 23228,
resi: 21978
See: State Government Listing.

PUNJAB STATE COOPERATIVE MILK PRODUCERS'
FEDERATION LIMITED, THE, SCO No 3015-
3018, Sector 22-D, Chandigarh 160022;
Ph: 20715, 27224, 29667, 31995, 31996,
Gram: Milkfed, Tlx: 0295-341.
Mg Dir: A S Sodhi, IAS, Ph off: 32987,
resi: 40620, 24331
Gen Mgr (R&D): D B Doda, Ph off: 20715,
resi: 29515
Gen Mgr (HQ): K L Rana, Ph off: 29667
Chief Mgr (Milk Proc & Tech Inputs): Dr M S
Bagga, Ph off: 31783
Chief Mgr (Mktg): S S Saran, Ph off: 32061,
resi: 28315

For more information, consult advertisements that
appear in this YEARBOOK. For their full list,
refer to the Advertisers Index.

HARYANA DAIRY DEVELOPMENT COOPERATIVE FEDERATION LIMITED

CHANDIGARH

Offer

A Range of Milky Delights

VITA PRODUCTS

- Vita Pure Ghee
- Vita Butter
- Vita Fat and Non-fat Milk Powder
- Vita Sweetened Condensed Milk

and

Vita Flavoured Bottled Milk

A 200-ml of Energy Punch in Different Flavours

DAIRY DEVELOPMENT PROGRAMME IN RAJASTHAN

- The milk producers of Rajasthan are no longer an exploited lot at the hands of the middleman.
- Through the network of more than four thousand Dairy Cooperative Societies, 2.34 lakh milk producers in the State are reaping the full fruits of their labour.
- The Rajasthan Cooperative Dairy Federation Ltd. is collecting over 7 lakh litres of milk everyday.
- Ten dairy plants and 24 chilling centres are functioning in full swing.
- To provide nutritious food to the livestock, five plants are engaged in producing the balanced cattle feed.
- The Federation manufactures and markets a wide range of milk products including Milk Powder, Paneer, Ghee, Flavoured Milk and Milk in Tetra Pak.
- Keep yourself and your family healthy by using SARAS brand milk and other milk products.

N. K. VARMA

Managing Director, RCDF

ISSUED BY RAJASTHAN COOPERATIVE DAIRY FEDERATION LTD., JAIPUR

Chief Mgr (Finance): B L Mahajan,
Ph off: 33292, resi: 32802
Chief Mgr (Engg & Proj): M M Munjial,
Ph off: 24651, resi: 20271
Mgr and Tech (R&D): H L Bhatia
Mgr (Admn): R S Riar, Ph off: 31875
Mgr (MIS): Jaspal Singh, Ph: 27224
Offr on Spl Duty: Sita Ram Goyal,
Ph off: 20715, resi: 24813
Mgr (Engg & Proj): S C Aggarwal
Mgr (MP & TI): M M Wadera
Mgr (Purchase): Jaswant Rai
Brand Name: Amber, Verka.

Rajasthan



RAJASTHAN COOPERATIVE DAIRY FEDERATION
LIMITED, Saras Sankul, Opp M R E College,
Jaipur 302017; Ph: 78791-4, Gram: Dairy-
fed, Tlx: 365-272 RCDF IN.
Mg Dir: N K Varma, IAS, Ph off: 62535,
resi: 69355
Dir (Admn): Rakesh Verma, Ph off: 77035,
resi: 67845
Secretary: N C Jain, Ph off: 79267,
resi: 65461
Consultant: Dr Harilal, Ph (resi): 79675
Comptroller: R L Agrawal, Ph off: 65504,
resi: 40268
Head (FO&AH): Dr J K Patel, Ph off: 73775,
resi: 77380
Gen Mgr (P&P): J K Khanna, Ph (resi): 79527
Mgr (SAHP): Dr G N Bhatt, Ph (resi): 74732
Mgr (Mktg): S K Sharma, Ph off: 65537,
resi: 79272
Mgr (Proj): D C Gupta, Ph (resi): 65783
Institution Dev Offr: N S Chauhan,
Ph (resi): 73774
Exec Engr: S P Arya, Ph (resi): 41044
Proj Analyst: S K Bhargava
OSD (Tech): M C Arora, Ph (resi): 75622
Dep Mgr (F&A): O P Mathur
Accounts Offr (Audit): Kamal Chhabra
Asst Dir (Publicity): S P Jain
PS to Mg Dir: S K Jain, Ph (resi): 69999
Programme Coordinator, NDDB: G K Goyal,
Ph off: 78791, resi: 649969
Liaison Offr: R C Sharma, C-206 Mansarovar

Garden, New Delhi 110015; Ph off: 530330,
resi: 5410849.
Brand Name: Saras.

Sikkim

SIKKIM COOPERATIVE MILK PRODUCERS UNION LTD,
Tadong, Gangtok 737102; Ph: 2463.
Mg Dir: P D Rai
Dairy Mgr: S K Dutta.

Tamil Nadu

TAMIL NADU COOPERATIVE MILK PRODUCERS' FED-
ERATION LIMITED, THE, Aavin Illam, Madha-
varam Milk Colony, PB No 2, Madras 600051;
Ph: 575531-5, Gram: Aavin, Tlx: 041-217.
Chmn: K Kalaimani, Ph off: 575423,
resi: 426165
Mg Dir: V Karuppan, IAS, Ph off: 575122,
resi: 413097
Chief Vigilance Offr: Layonal Devasahayam
Sr Mgr (Plg): Akbar Hussain Sheriff
Sr Mgr (Finance): L A Irudayaraj
Sr Mgr (Mktg): M Gopal
Sr Mgr (Milk Prod): Dr S P Anbumani
Sr Mgr (Engg): T S Chandrasekaran
Personnel Mgr: V Murugaiyan
Exec Engr (Civil): T Krishnaprakash
Gen Mgr: M H Jalal, IAS, Plot No 29 & 30,
Industrial Estate, Ambattur, Madras;
Ph off: 64287, 654421, resi: 48656
Mgr (Prod), Ambattur Dairy: M Sivaguru,
Ph off: 654001, resi: 64242
Mgr (Prod), Madhavaram Dairy: Joseph Chandra-
sekarsingh, Ph off: 575242, resi: 652060
Dairy Mgr, Ayyanavaram Dairy: M R Samarasam,
Ph off: 615742
Mgr (Quality Control): N Sankaran,
Ph off: 654001
Mgr (Mktg): Mirkhayam Ali, No 5 Manonmaniam-
mal St, Kilpauk, Madras 600010; Ph off:
662748, resi: 843478
Mgr (Bulk Vending): K Athimoolam, Ph off:
450583, resi: 575882
Mgr (Engineering): S Dharmaraj, TCMPF, Ambat-
tur, Madras 600098; Ph off: 652066
Brand Name: Aavin.

OFFICE OF THE COMMISSIONER FOR MILK PRODUC-
TION & DAIRY DEVELOPMENT, Govt of Tamil

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● No. of District Co-operative Milk Producers' Unions	...	...	6
● No. of Primary Societies	...	...	1,120
● No. of Farmer Members	...	...	63,177
● No. of A.I. Sub-centres	...	...	434
● Average Procurement per day ('000 litres) (1986-87 upto Dec. '86)	...	...	49.6
● No. of Dairy Plants	...	...	2
● No. of Chilling Plants	...	...	12
● No. of Cattle Feed Plants	...	...	2
● No. of Liquid Nitrogen Plants	...	...	3

WEST BENGAL CO-OPERATIVE MILK PRODUCERS' FEDERATION LIMITED
Block AE-387, Sector-I, Salt Lake City, Calcutta 700064.

Phone: 37-4840

Nadu, Madhavaram Milk Colony, Madras
600051; Ph: 575423.
Commissr: V Karuppan, IAS, Ph off: 575423,
resi: 426165.

Tripura

TRIPURA COOPERATIVE MILK PRODUCERS UNION
LTD, Agartala Dairy, Indranagar, Agar-
tala 799006, Tripura West; Ph: 3524, 3801.
Mg Dir: J L Kar
Gen Mgr: M L Chakraborty.

Uttar Pradesh

MILK COMMISSIONER'S OFFICE, Dairy Dev Dept,
Jawahar Bhawan, 4th Floor, North Wing,
Ashok Marg, Lucknow.
Milk Commissr: V K Sharma, IAS,
Ph off: 42869, resi: 43693
Addl Milk Commissr: K L Sharma, Ph: 43641
Dep Milk Commissr: Pancham Lal, Ph: 34464
Dep Sec (Milk Board): B M Mishra, Ph: 34460
See: State Government Listing.



UPRADESHIK COOPERATIVE DAIRY FEDERATION LTD,
29 Park Rd, Lucknow 226001; Ph: 44401,
32448, 48214, Gram: Dairyfed, Tlx:
0535-285.
Mg Dir: V K Sharma, IAS, Ph off: 42869,
resi: 43693
Chief Gen Mgr: Nav Tej Singh, IAS,
Ph off: 35129
Gen Mgr (Personnel & Admn): V P Dube,
Ph off: 44401, resi: 51945
Gen Mgr (Proc & Inputs): Dr R K Singh
Gen Mgr (Mktg): Dr R C Awasthi
Gen Mgr (Finance): O P Shukla
Gen Mgr (Commercial): K N Ghosh,
Gen Mgr (P&E): S S Sharma, Ph (resi): 32266
Gen Mgr (MSD): G C Govil, Ph: 43196
Gen Mgr (Coop Law & Election): Dr R C Misra,
Ph off: 72843, resi: 32446
Sr Mgr (Mktg): A H Rizvi
Mgr (Purchase): S K Gopal
Mgr (Mktg): A K Das

Delhi Off: 6/37 WEA Karol Bagh, New Delhi
110005; Ph: 581706; Mgr: B M Singh.
Brand Name: Parag.

West Bengal

DIRECTORATE OF DAIRY DEVELOPMENT, 23A Netaji
Subhas Rd, 9th Floor, Calcutta 700001;
Ph: 204535-36, Gram: Dairycal.
Milk Commissr: J P Pal, Ph: 257494.
See: State Government Listing.

MOTHER DAIRY CALCUTTA, PO Chakundi 712702,
Dist Hooghly; Ph: 643578, 643182, 643493,
Gram: Motherdairy Chanditala.
Gen Mgr: M A Shaikh, Ph (resi): 643580.
See: Milk Plants.

WEST BENGAL COOPERATIVE MILK PRODUCERS' FED-
ERATION LIMITED, Block AE-387, Sector I,
Salt Lake, Bidhan Nagar, Calcutta 700064;
Ph: 374840, Gram: Benmilk.
Mg Dir: H P Roy, IAS, Ph off: 491403,
resi: 483487
Mgr (Finance): Haradhan Banerjee
Mgr (Engg): M K Chowdhury
Mgr (Mktg): Samarjit Chakraborty
Secretary: Kumar Mukhopadhyay
MIS Offr: Amithaba Kar
Proc Supdt: Bikash Gupta
Office Supdt: T K Chattopadhyay
Incharge, Cattle Feed Plant, Behrampore:
Tushar. Mukhopadhyay.

WEST BENGAL DAIRY & POULTRY DEVELOPMENT COR-
PORATION LTD, 16 Netaji Subhas Rd, Cal-
cutta 700001; Ph: 229432, Gram: Dairy poul.
Mg Dir: K P Banerjee, Ph: 224579.

Late Additions

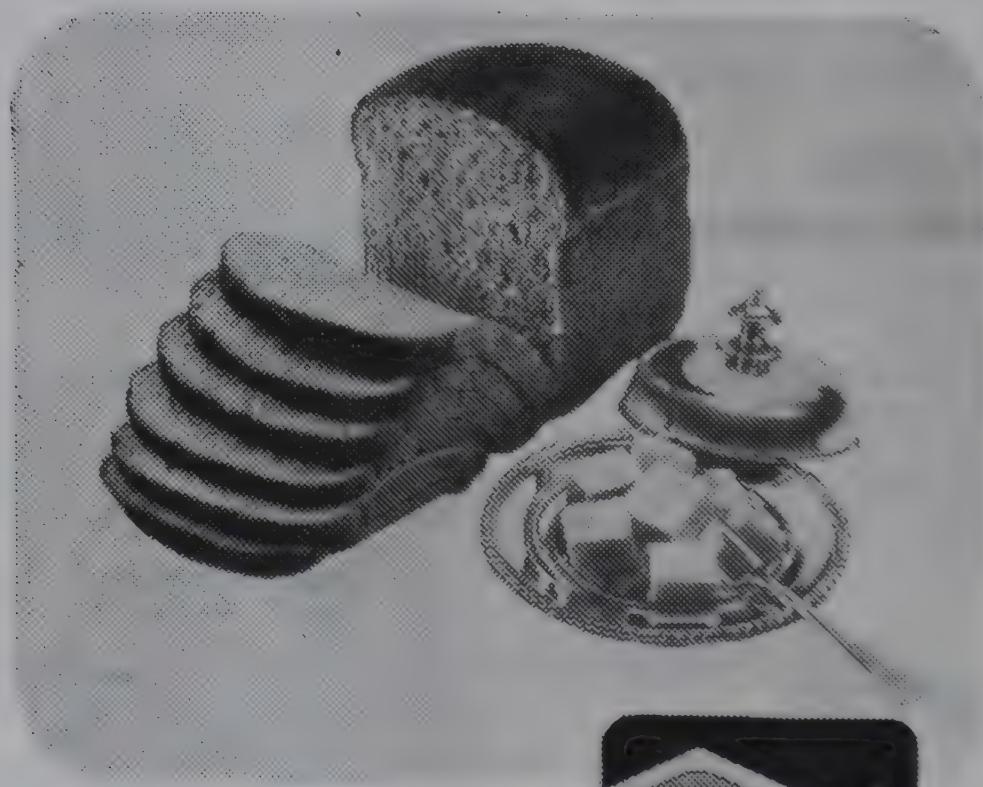
HARYANA

Rattan Enterprises, Vill & PO Punhana
121104, Dist Gurgaon; Ph: 54; Chief
Exec: Narinder Kumar. Brand Name: Mohit.

MAHARASHTRA

SHRI VINAYAK MILK CENTRE, Eruchshaw Building,
Dr D N Rd, Bombay 400001; Ph: 266761,
266762, 266763; Chief Exec: Mahesh Doctor,
Ph (resi): 687214.

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Milk Plants

Listed below are fluid milk plants, arranged statewide, with their installed capacities and average throughputs, wherever available. Also included are chilling centres. Excluded are milk product factories which are covered in the listing of Dairy Product Manufacturers.

Andhra Pradesh

ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, Lalapet, Hyderabad 500017; Ph: 71851-9, Gram: Apdairy, Tlx: 0155-545; Mg Dir: K Sadasiva Rao, IPS. MILK PLANTS — Anantapur: Ph: 2596; Mgr: G Ramaiah; Inst Cap: 25,000 lpd; Chittoor: Milk Products Factory, -517002; Ph: 2075; Gen Mgr: Dr V Rajagopala Raju, Ph (resi): 2071; Cuddapah: Milk Products Factory, Proddutur; Ph: 2853; Gen Mgr: V Ranga Rao, Ph (resi): 2418; Guntur: Sangam Dairy, Vadlamudi 522213; Ph: 3711; Gen Mgr: T Krishna Murthy, Ph (resi): 3712; Inst Cap: 250,000 lpd; Hyderabad: Milk Products Factory, Lalapet, -500017; Ph: 703363; Gen Mgr: Dr V Raghava Rao, Ph (resi): 71839; Karimnagar: Ph: 20688; Inst Cap: 12,000 lpd; Khammam: Ph: 8570; Inst Cap: 12,000 lpd; Krishna: Milk Products Factory, Vijayawada 520009; Ph: 75346; Gen Mgr: Dr K V Pitchaiah, Ph (resi): 74346; Inst Cap: 200,000 lpd; Kurnool: Ph: 20928; Mgr: P Bushanna, Ph (resi): 20690; Inst Cap: 25,000 lpd; Nellore: Ph: 6528; Mgr: S M Hussain; Inst Cap: 52,000 lpd; Nizamabad: Ph: 803; Mgr: V Sambamurthy; Inst Cap: 12,000 lpd; Ongole: Prakasam Dist; Ph: 3059; Mgr: P S Prasad Rao; Inst Cap: 46,000 lpd; Rajahmundry: East Godavari Dist; Ph: 5157; Mgr: M Padmanabhaiah; Inst Cap: 53,000 lpd; Vishakhapatnam: Ph: 7555; Gen Mgr: Dr L Lakshmipathi Raju, Ph (resi): 64550; Inst Cap: 100,000 lpd; Warangal: Ph: 7483; Mgr: V Lakshminarayana; Inst Cap: 12,000 lpd. CHILLING CENTRES — Chittoor Dist: Madhanapalli (Inst Cap: 12,000 lpd, Av Thput:

17,159 lpd), Pitchatur (Inst Cap: 12,000 lpd, Av Thput: 6,920 lpd); Krishna Dist: Chillakallu (Inst Cap: 12,000 lpd, Av Thput: 3,795 lpd), Gudlavalleru (Inst Cap: 18,000 lpd, Av Thput: 13,466 lpd), Hanuman Junction (Inst Cap: 18,000 lpd, Av Thput: 13,384 lpd), Pamarru (Inst Cap: 18,000 lpd, Av Thput: 1,219 lpd), Tiruvur (Inst Cap: 12,000 lpd, Av Thput: 3,909 lpd), Veerankilock (Inst Cap: 18,000 lpd, Av Thput: 12,950 lpd); Kurnool Dist: Banvasi (Inst Cap: 12,000 lpd, Av Thput: 2,246 lpd); Mahabubnagar Dist: Kadthal (Inst Cap: 12,000 lpd, Av Thput: 5,307 lpd), Kalvakurti (Inst Cap: 4,000 lpd, Av Thput: 2,649 lpd), Mahabubnagar (Inst Cap: 12,000 lpd, Av Thput: 2,022 lpd), Shadnagar (Inst Cap: 18,000 lpd, Av Thput: 5,452 lpd); Medak Dist: Gajwel (Inst Cap: 12,000 lpd, Av Thput: 8,537 lpd), Medak (Inst Cap: 12,000 lpd, Av Thput: 2,868 lpd), Zahirabad (Inst Cap: 12,000 lpd, Av Thput: 3,720 lpd); Nalgonda Dist: Bhongiri (Inst Cap: 18,000 lpd, Av Thput: 8,332 lpd), Nalgonda (Inst Cap: 12,000 lpd, Av Thput: 3,112 lpd), Suryapet (Inst Cap: 12,000 lpd, Av Thput: 3,150 lpd); Prakasam Dist: Ongole (Inst Cap: 40,000 lpd, Av Thput: 53,241 lpd); Ranga Reddy Dist: Parigi (Inst Cap: 6,000 lpd, Av Thput: 2,057 lpd); Srikakulam Dist: Srikakulam (Inst Cap: 12,000 lpd, Av Thput: 819 lpd); Vishakhapatnam Dist: Narisipatnam (Inst Cap: 12,000 lpd, Av Thput: 14,704 lpd); Warangal Dist: Thorrruru (Inst Cap: 6,000 lpd, Av Thput: 1,742 lpd); West Godavari Dist: Bhimavaram (Inst Cap: 12,000 lpd, Av Thput: 5,844 lpd. MINI CHILLING CENTRES (No of centres: 15, Total Cap: 90,000 lpd (6,000 lpd each), Total Av Thput: 69,631 lpd) — Alair, Chityal, Cumbum, Hindupur, Kamareddv. Kavali, Mallepalli, Narayanakad,

See also LATE ADDITIONS at the end of the listing

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Pilaru, Siddipet, Srikalahasti, Turi, Venkatagiri, V'Kota, Wanapanthi. COOLING CENTRES: (Total: 5, Total Cap: 20,000 lpd (4,000 lpd each, Total Av Thput: 12,501 lpd) -- Bhimadol, Kalyakurti, Mulugu, Nirmal, Ramabhadrapuram.

Assam

DIRECTORATE OF DAIRY DEVELOPMENT, Govt of Assam, PO Khanapara, Guwahati 781022; Ph: 87117; Dir: Dr Abdus Sattar. MILK PLANTS -- Guwahati: PO Khanapara, Guwahati 781022; Ph: 87784; Plant Mgr: D B Sanyal; Plant Mgr (Shift): S Das; Milk Tester: H Thakuria; Quality Control Offr: Dr I K Baruah; Inst Cap: 20,000 lpd; Jorhat: Plant Mgr: D D Deka; Quality Control Offr: Dr S Gogoi; Inst Cap: 6,000 lpd. CHILLING PLANTS -- Dibrugarh, Lakhimpur, Silchar, Tezpur.

Bihar

BIHAR STATE COOPERATIVE MILK PRODUCERS FEDERATION LTD, B-9 Shrikrishnapuri, Patna 800001; Ph: 24716, Gram: Compfed, Tlx: 022-215; Mg Dir: G S Kang, IAS. MILK PLANTS -- Barauni Dairy: PO Barauni 851112, Dist Begusarai; Ph: 30; Mgr (Proc): T K Das; Plant Incharge: S M Amir; Inst Cap: 100,000 lpd; Bokaro Dairy: (Near BMP 4), Bokaro Steel City, Dhanbad 827001; Ph: 7151, 7309; Offr Incharge: P K Verma; Inst Cap: 25,000 lpd; Gaya Dairy: Katari Hill Rd, PO Karim Ganj, Gaya 823001; Ph: 21741; Plant Incharge: R K P Sinha; Inst Cap: 6,000 lpd; Jamshedpur Dairy: PO Gamharia 832108; Ph: 87461; Mgr (Dairy): T T Sen; Inst Cap: 25,000 lpd; Munger Dairy: Pir Pahari, PO Bengir; Ph: 2684; Offr Incharge: Suresh Kumar; Inst Cap: 10,000 lpd; Muzaffarpur Dairy: PO Kolua Pagambarpur, Dist Muzaffarpur; Ph: 4423, 4483; Mgr (Dairy): S Verma; Mgr (Proc): Dr M K Neogy; Inst Cap: 25,000 lpd; Ranchi Dairy: PO Nyorivikash, Ranchi 834001; Ph: 24855; Offr Incharge: Milton; Inst Cap: 6,000 lpd; CHILLING CENTRES -- Khagaria: Offr Incharge: D K Singh; Area Offr: M S Saha; Inst Cap: 10,000

lpd; Tajpur: Samastipur Dist; Ph: 457; Offr Incharge: D K Sarkhel; Area Offr: A K Sinha. Inst Cap: 20,000 lpd.

PATNA DAIRY PROJECT (Managed by National Dairy Development Board), Govt of Bihar, B-9 Srikrishnapuri, Patna 800001; Ph: 22685, 26347, Gram: Dairyboard; Dir: Dr Jagjit S Punjra. Inst Cap: 100,000 lpd, Av Thput: 50,000 lpd.

Delhi

DELHI MILK SCHEME, Govt of India, West Patel Nagar, New Delhi 110008; Ph: 588218, Gram: Delmilk; Chmn: Dr Chhatra Sal Singh, IAS, Ph: 585109; FA & CAO: Arun Sedwal, Ph: 583692; Dep Gen Mgr (Tech): M N Khan, Ph: 588159; Dep Gen Mgr (Admn): Baldev Chand, IAS, Ph: 586355; Mgr (Sales Promotion): V B Saran, Ph: 585098; Mgr (Proc & CD): R K Bhargava, Ph: 584175; Mgr (Distribution): K D P Sinha, Ph: 583047; Dep Mgr (Quality Control): Man Mohan, Ph: 5713129; Sr Dairy Engr: I P Bhasin, Ph: 5713129; Jr Dairy Engr: G S Mann, Ph: 588218/236. Inst Cap: 415,000 lpd, Av Thput: 360,000 lpd.

MOTHER DAIRY (A Govt of India dairy, managed by the National Dairy Development Board), Patparganj, Delhi 110092; Ph: 2241991 (10 lines), 2241455 (Control Room), Gram: Motherdairy; Gen Mgr: Deepak Tikku, Ph off: 601480, 2242158, resi: 6439577; Dep Gen Mgr (Comm & Admn): S K Das, Ph: 2241440; Mgr (Process): Vacant; Mgr (Quality Control): P N Reddy, Ph (resi): 2241612; Mgr (Bulk Vending): Vacant; Mgr (MD, Trg & PR): R N Arora; Public Relations Offr: A K Nayyar. Inst Cap: 50,000 lpd, Av Thput, Jan 86: 521,322 lpd; July 86: 571,434 lpd.

NANAK DAIRY PLANT, Head Off: A-10/6 Vasant Vihar, New Delhi 110057; Ph: 672898; Founder: Nanak Singh, Ph (resi): 673530; Mg Partners: Shivraj Singh, Onkar Singh, Bhupinder Singh; Tech Consultant: S S Mann, Mann Food & Dairy Services. Plants -- Haryana: Hodal; Inst Cap: 100,000 lpd; Punjab: Fatehgarh Churian, Dist Gurdaspur. Inst Cap: 130,000 lpd.

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Goa

GOA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LIMITED, Dairy Plant, Curti, Ponda, Goa 403401; Ph: 92, off: 247, Gram: Goa-dairy; Acting Mg Dir: P K Ghatge; Addl Mgr: Dr S G Naik; Shift Supdts: V C Panveker, R D Revonker, P V F Dessai; Milk Proc Offrr: D P Bhatiker. Inst Cap: 30,000 lpd.

Gujarat

BANASKANTHA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, PB No 20, Palanpur 385001; Ph: 2259; Mg Dir: Dr R Saini. Inst Cap: 175,000 lpd.

BARODA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Baroda Dairy, Makarpura Rd, Baroda 390009; Ph: 555066; Mg Dir: Hemendra R Dholakia. Inst Cap: 100,000 lpd.

BHARUCH DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Dudh Dhara Dairy, PB No 29, N H No 8, Bholav, Bharuch 392002; Ph: 2048; Gen Mgr: R S Patel. Inst Cap: 60,000 lpd.

GUJARAT DAIRY DEVELOPMENT CORPORATION LTD, Nigam Bhavan, Sector 16, Gandhinagar 382016; Ph: 22881, Gram: Dairycorp; Chmn: Jivabhai Keshvala; Mg Dir: C R Biswas, IAS. MILK PLANTS -- Abad Dairy: Kankaria Rd, Ahmedabad 380022; Ph: 54645-49; Gen Mgr: A K Datta; Inst Cap: 200,000 lpd, Av Thput: 280,000 lpd; Bhavnagar Dairy: Gaurishankar Lake Rd, -364002; Ph: 27886, 28554; Sr Mgr: R K Kathpalia; Inst Cap: 30,000 lpd, Av Thput: 30,000 lpd; Chalala Dairy: Chalala, Dist Amreli; Ph: 82; Mgr: Y S Malek; Inst Cap: 20,000 lpd, Av Thput: 25,000 lpd; Gandhinagar Dairy: Sector 25, 'K' Rd, GIDC Estate; Ph: 22877; Dep Mgr: James Joseph; Jamnagar Dairy: Saru Section Rd, -362001; Dep Mgr: V P Khamar; Inst Cap: 25,000 lpd, Av Thput: 3,500 lpd; Junagadh Dairy: Jaffar Maidan, -362001; Ph: 20478; Mgr: G A Patel; Inst Cap:

30,000 lpd, Av Thput: 43,000 lpd; Kutch Dairy: Madhapur, Kutch-Bhuj 370020; Ph: 1555; Mgr: Devang Mehta; Inst Cap: 20,000 lpd, Av Thput: 17,000 lpd; Rajkot Dairy: Dudhsagar Marg, -360001; Ph: 67353-54; Gen Mgr: G R Ralhan; Sr Mgr: S R Trivedi; Inst Cap: 45,000 lpd, Av Thput: 75,000 lpd; Surendranagar Dairy: Wadhvan City, -363030; Ph: 1788; Sr Mgr: A M Bhayla; Inst Cap: 30,000 lpd, Av Thput: 44,000 lpd. CHILLING CENTRES: Chotila, Daulatpar, Gadhdha, Halwad, Kutiana, Patdi, Rajula, Rapar, Rau, Talala, Vankaner, Vinchhiya.

KAIRA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Anand 388001; Ph: 3402, Gram: Amuldairy, Tlx: 0172-208; Mg Dir: V H Shah. Inst Cap: 880,000 lpd, Av Thput: 612,000 lpd.

MEHSANA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Dudhsagar Dairy, PB No 1, Mehsana 384002; Ph: 2201; Mg Dir: Babubhai C Bhatt. Inst Cap: 750,000 lpd, Av Thput: 574,000 lpd.

PANCHMAHAL DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Near SRP Camp, Lunawada Rd, PB No 37, Godhra 389001; Ph: 2660; Gen Mgr: R K Mathur. Inst Cap: 90,000 lpd.

SABARKANTHA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Sabar Dairy, PB No 21, Himatnagar 383001; Ph: 801; Mg Dir: B K Rabari. Inst Cap: 450,000 lpd, Av Thput: 286,000 lpd.

SURAT DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Sumul Dairy, PB No 501, Surat 395008; Ph: 27691-5, Gram: Sumul, Tlx: 0178-208; Mg Dir: Dr Thakorabhai D Patel. Inst Cap: 200,000 lpd.

VALSAD DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Vasundhara Dairy, NH No 8, At Alipur 396409, Tq Chikhli; Ph: 287; Gen Mgr: N B Vashi. Inst Cap: 60,000 lpd.

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Haryana

ANAND DAIRIES LIMITED, G T Rd, Vill Samana-
vahu, Dist Karnal; Genl & Mg Dir: Anand
Dev Sharma. Av Thput: 30,000 lpd.

HARYANA DAIRY DEVELOPMENT COOPERATIVE FED-
ERATION LTD, SOC No 127-128, Sector 17C,
Chandigarh 160017; Ph: 40059, 26624,
21124; Mg Dir: G Prasanna Kumar, IAS.
MILK PLANTS — Anbala: Gen Mgr: R K
Jhhabra, Ph: 56242, 56758 (resi); Inst Cap:
20,000 lpd; Ballabgarh: Dist Faridabad;
Ph: 42375; Gen Mgr: Amrik Singh; Inst Cap:
50,000 lpd; Bhiwani: Hansi Rd; Ph: 2427;
Gen Mgr: S K Arora, Ph (resi): 2423; Inst
Cap: 15,000 lpd; Jind: Hansi Rd; Ph: 2353;
Gen Mgr: D B Rajput, Ph (resi): 2452;
Inst Cap: 50,000 lpd; Rohtak: Gohana Rd;
Ph: 5919; Project Mgr: Dev Gupta; Inst
Cap: 100,000 lpd; Sirsa: Rego Rd; Ph:
2335; Project Exec Offr: Dr A K Ganju.

Himachal Pradesh

HIMACHAL PRADESH STATE COOPERATIVE MILK PRO-
DUCERS' FEDERATION LIMITED, Totu, Shimla
171011; Ph: 5451, Gram: H F Milkfed; Mg
Dir: I D Moudgil, Ph (resi): 6817. **MILK
PLANTS** — Mandi: Ph: 4791; Factory Mgr:
B C Pillay; Inst Cap: 10,000 lpd, Av
Thput: 4,600 lpd; Shimla: Ph: 5246;
Factory Mgr: M L Sharma; Inst Cap: 10,000
lpd, Av Thput: 8,500 lpd. **MILKING
CENTRES**: (Inst Cap indicated in brackets)
— Bagthan (2,000 lpd), Bhaskia (2,000
lpd), Bilaspur (2,000 lpd), Parlaghat
(5,000 lpd), Jalari (2,000 lpd), Kataula
(2,000 lpd), Kothi (2,000 lpd), Kuma
(2,000 lpd), Maryat (2,000 lpd), Mahan
(5,000 lpd), Nalagarh (2,000 lpd), Raj-
garh (2,000 lpd), Benuka (2,000 lpd),
Saraban (4,000 lpd), Sidhyani (2,000 lpd).

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ing agency, or a government office? Check the table of
contents in the opening pages or the Advertiser's
Index. Also, consult the Buyer's Guide to various
products and services.

Jammu & Kashmir

JAMMU COOPERATIVE MILK FEDERATION LTD, Jammu
Jantila; Dir: C E Vira; Inst Cap: 10,000
lpd, Av Thput: 8,000 lpd. Proposed Plant:
Kalu Chak, Jammu. Inst Cap: 60,000 lpd.

KASHMIR VALLEY MILK PRODUCERS COOPERATIVE
FEDERATION LIMITED, PO Chashno-Shari,
Bran Tabeil, Srinagar; Mg Dir: A B Shutt
Inst Cap: 10,000 lpd, Proposed Capacity:
60,000 lpd.

Karnataka

KARNATAKA COOPERATIVE MILK PRODUCERS FEDER-
ATION LIMITED, No 22 Poornima Bldgs, J C
Rd, 1st Cross, Bangalore 560007; Ph:
220691, Gram: Mandini; Mg Dir: C Muniswami
IAS, Ph: 227504. **MILK PLANTS** — Bangalore
Dairy: Hosur Rd, -560029; Ph: 40061, Gram:
Mydairy; Dir: Vidyashankar, IAS, Ph off:
40065, resi: 42177; Inst Cap: 150,000 lpd,
Av Thput: 94,292 lpd; Belgaum Dairy: Mal-
naruthi Extn, -590016; Ph: 26842, Gram:
Milk; Gen Mgr: Mruthyunjaya, Ph off: 2155
resi: 26842; Inst Cap: 10,000 lpd, Av
Thput: 4,472 lpd; Bellary Dairy: Near
Vive Station, -585104; Gen Mgr: H N
Subbaswamy, Ph off: 4152; Inst Cap: 4,000
lpd, Av Thput: 1,455 lpd; Dharwad Dairy:
Rayapur, -585004; Ph: 60181; Gen Mgr:
Channaiiah, Ph off: 60181, resi: 60182;
Inst Cap: 100,000 lpd, Av Thput: 24,000
lpd; Gulbarga Dairy: Mandya Dist; Ph: 115
(Maddur Ex); Gen Mgr: A S Premnath, Ph
off: 36 (Hanakere Ex); Inst Cap: 100,000
lpd, Av Thput: 46,569 lpd; Gulbarga Dal:
Humnabad Rd, -585104; Ph: 20475, Gram:
Mandini; Gen Mgr: K Yeriswamy, Ph off:
20675, resi: 20669; Inst Cap: 10,000 lpd,
Av Thput: 8,660 lpd; Hassan Dairy: PB N
120, B M Rd, -573201; Ph: 8301, Gram:
Mandini; Gen Mgr: Sayanna, Ph off: 8221
resi: 8170; Inst Cap: 60,000 lpd, Av
Thput: 35,081 lpd; Kudige Dairy: Coorg
Dist 571257; Ph: 191 (Kushalnagar Ex),
Gram: Mandini; Gen Mgr: Ravikumar Kakad
Ph off: 73; Inst Cap: 70,000 lpd, Av
Thput: 8,767 lpd; Mangalore Dairy: Kula-
shakar, -575005; Ph: 25060, Gram: Man-
dini; Gen Mgr: Mohamed Ghouse, Ph off:

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31398, resi: 3394; Inst Cap: 10,000 lpd, Av Thput: 2,171 lpd; Mother Dairy: GKVK Post, Yelahanka, Bangalore 560065; Ph: 41 (Yelahanka Ex), Gram: Mother Nandini; Gen Mgr: K G Rudreshappa; Inst Cap: 200,000 lpd; Mysore Dairy: Siddartha Layout, T Narasipura Rd, -570001; Ph: 23923, Gram: Nandini; Gen Mgr: Malleshappa, Ph off: 22837, resi: 23279; Inst Cap: 60,000 lpd, Av Thput: 29,438 lpd; Rayapur (packing and distribution only): Dharwad Dist; Ph: 80181; Gen Mgr: Channaiah; Shimoga Dairy: Machenahalli, Nidige Post, -577222; Ph: 2670; Gen Mgr: Chennur; Inst Cap: 10,000 lpd, Av Thput: 5,132 lpd; Tumkur Dairy: PB No 4, Mallasandra, -572101; Ph: 2264, Gram: Nandini; Gen Mgr: K L Gajendran, Ph: 8195; Inst Cap: 60,000 lpd, Av Thput: 37,954 lpd.

CHILLING CENTRES: Anekal (Inst Cap: 10,000 lpd, Av Thput: 13,999 lpd); Bagepalli (Inst Cap: 8,000 lpd, Av Thput: 13,326 lpd); Byrapatna (Inst Cap: 30,000 lpd, Av Thput: 16,617 lpd); Chamaraj-nagar (Inst Cap: 20,000 lpd, Av Thput: 19,340 lpd); Chintamani (Inst Cap: 20,000 lpd, Av Thput: 55,230 lpd); Doddaballapura (Inst Cap: 40,000 lpd, Av Thput: 57,092 lpd); Hunsur (Inst Cap: 20,000 lpd, Av Thput: 8,514 lpd); K R Pet (Inst Cap: 20,000 lpd, Av Thput: 4,229 lpd); Karwar (Inst Cap: 10,000 lpd); Kolar (Inst Cap: 10,000 lpd, Av Thput: 17,001 lpd); Raichur (Inst Cap: 10,000 lpd, Av Thput: 646 lpd); Sira (Inst Cap: 20,000 lpd, Av Thput: 4,255 lpd); Siraguppa (Inst Cap: 10,000 lpd, Av Thput: 3,814 lpd).

FARM COOLERS — B R Project (Inst Cap: 4,000 lpd); Bagalkot (Inst Cap: 2,000 lpd, Av Thput: 2,053 lpd); Bagalkot (Inst Cap: 2,000 lpd, Av Thput: 2,053 lpd); Balehonnur (Inst Cap: 2,000 lpd); Bidar (Inst Cap: 4,000 lpd, Av Thput: 1,164 lpd); Bijapur (Inst Cap: 4,000 lpd, Av Thput: 1,048 lpd); Birur (Inst Cap: 4,000 lpd, Av Thput: 1,970 lpd); Channagiri (Inst Cap: 2,000 lpd, Av Thput: 3,624 lpd); Gadag (Inst Cap: 5,000 lpd); Gokak (Inst Cap: 2,000 lpd, Av Thput: 2,774 lpd); Haliyal (Inst Cap: 2,000 lpd); Haveri (Inst Cap: 5,000 lpd, Av Thput: 6,000 lpd); Honnali (Inst Cap: 4,000 lpd, Av Thput: 5,527 lpd); Hudgi (Inst Cap: 8,000 lpd, Av Thput: 3,719 lpd); Hulkoti (Inst Cap: 5,000 lpd, Av Thput: 1,750 lpd); Jamkhandi (Inst Cap: 2,000 lpd, Av Thput: 1,469 lpd); Kakanur (Inst Cap: 2,000 lpd); Kittur (Inst Cap:

4,000 lpd, Av Thput: 3,779 lpd); Mundgod (Inst Cap: 5,000 lpd, Av Thput: 2,100 lpd); Pavagada (Inst Cap: 2,000 lpd, Av Thput: 916 lpd); Puttur (Inst Cap: 4,000 lpd, Av Thput: 4,655 lpd); Siddapur (Inst Cap: 2,000 lpd); Sirsi (Inst Cap: 5,000 lpd, Av Thput: 600 lpd); Yedyur (Inst Cap: 10,000 lpd, Av Thput: 11,727 lpd).

Kerala

KERALA COOPERATIVE MILK MARKETING FEDERATION LTD, 'Arkanilayam', Vazhuthacaud, Trivandrum 695014; Ph: 66645, 63113, Gram: Kera-milk, Tlx: 357; Mg Dir: K J Alphons, IAS, Ph off: 67942, 61495.

MILK PLANTS — Alleppey Dairy: Punnappara, -688004; Ph: 3035; Dairy Mgr: N Janardhanan Pillai, Ph (resi): 5587; Inst Cap: 4,000 lpd; Cannanore Dairy: PO Pallikunnu, -670004; Ph: 5030; Dairy Mgr: P V George, Ph (resi): 5281; Inst Cap: 10,000 lpd; Ernakulam Dairy: Edappally, Cochin 682024; Ph: 5631; Dairy Mgr: M R Saratchandran, Ph (resi): 5422; Inst Cap: 50,000 lpd; Kottayam Dairy: Vadavathoor PO, -686010; Ph: 8112; Dairy Mgr: Unnikrishna Pillai, Ph (resi): 8764; Inst Cap: 6,000 lpd; Palghat Dairy: PO Kallepully, -678005; Ph: 3682; Dairy Mgr: P P Pappachan, Ph (resi): 5382; Inst Cap: 6,000 lpd; Quilon Dairy: Thevally PO, -691009; Ph: 3884, 2521; Dairy Mgr: K Sankaran Kutty Nair; Inst Cap: 60,000 lpd; Trivandrum Dairy: Pattom PO, -695004; Ph: 75712, 78148, 76562; Dairy Mgr: Jacob Varghese, Ph (resi): 66171; Inst Cap: 40,000 lpd.

CHILLING PLANTS — Anakkara, Idukki Dist (Inst Cap: 2,000 lpd); Attapadi, Mannarghat, Palghat (Inst Cap: 2,000 lpd); Chelakkara, Trichur Dist (Inst Cap: 2,000 lpd); Karunagapally, Quilon Dist (Inst Cap: 15,000 lpd); Kattapana, Idukki Dist (Inst Cap: 4,000 lpd); Kumbazha, Pathanamthitta Dist (Inst Cap: 2,000 lpd); Maranalloor, Neyyattinkara, Trivandrum 695507 (Inst Cap: 10,000 lpd); Mavelikkara, Alleppey 690101 (Inst Cap: 2,000 lpd); Munnar, Idukki Dist (Inst Cap: 4,000 lpd); Mudavoor, Muvattupuzha 686669, Ernakulam Dist (Inst Cap: 4,000 lpd); Pattikkad, Trichur 680652 (Inst Cap: 6,000 lpd); Perambra, Kodakara, Trichur Dist (Inst Cap: 4,000 lpd); Thondiyl, Peravoor, Cannanore 670673 (Inst Cap: 2,000 lpd); Yeroor (Inst Cap: 2,000 lpd).

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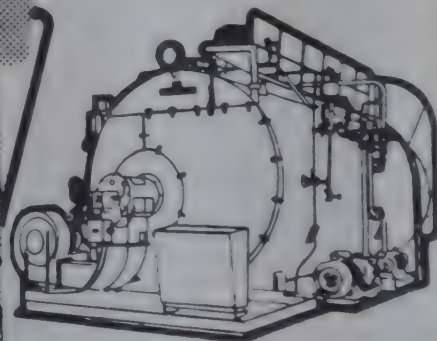
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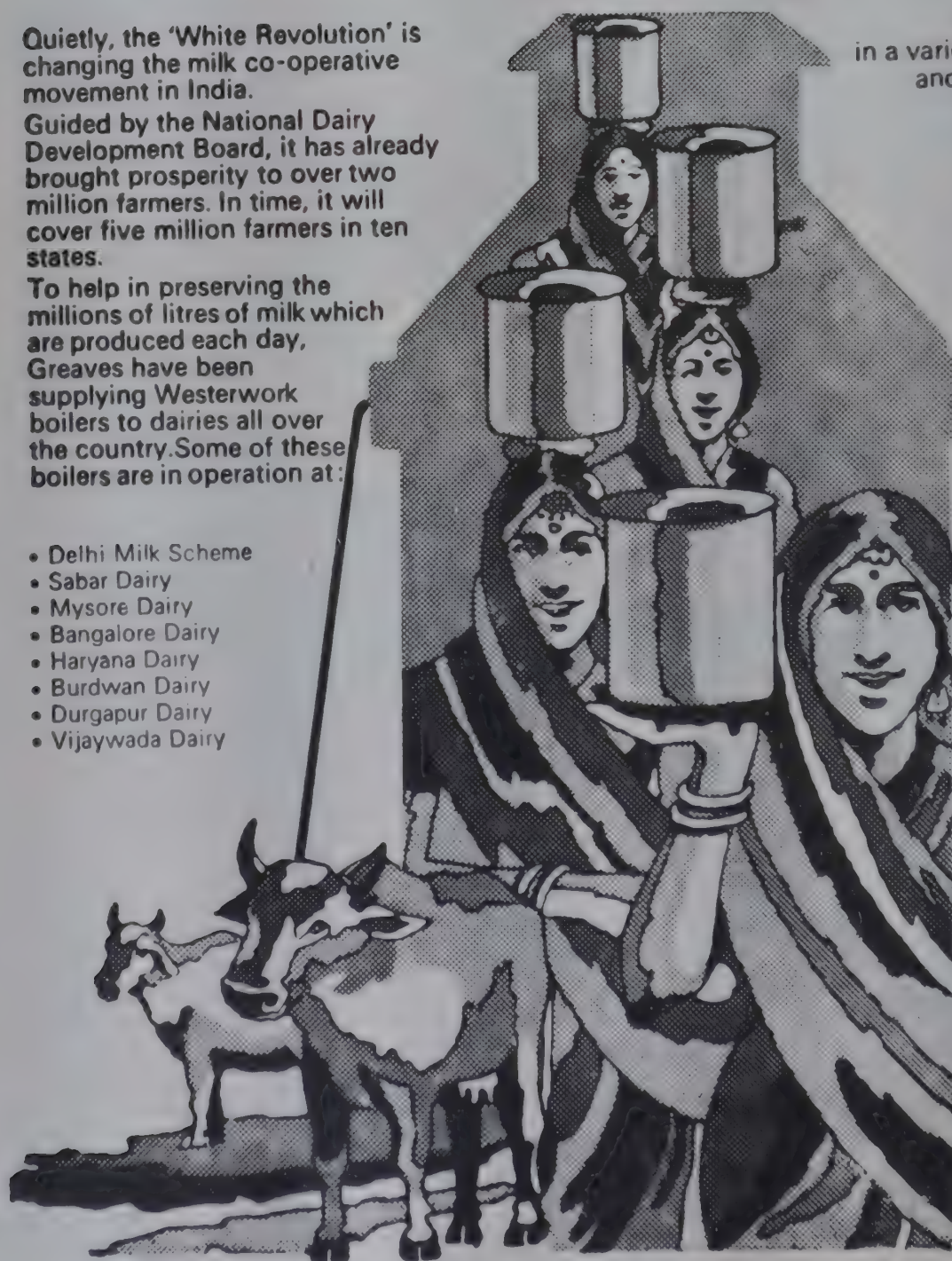
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Madhya Pradesh

MADHYA PRADESH DUGDHA MAHASANGH (SAHAKARI)

MARYADIT, Guru Teg Bahadur Complex, Roshanpura, Bhopal 462003; Ph: 61365-66, Gram: Dugdhanigam, Tlx: 0705-237; Mg Dir: Jaimini Sharma, IAS. MILK PLANTS — Bhopal (Inst Cap: 100,000 lpd); Gwalior (Inst Cap: 200,000 lpd); Indore (Inst Cap: 200,000 lpd); Jabalpur (Inst Cap: 100,000 lpd); Raipur (Inst Cap: 100,000 lpd); Sagar (Inst Cap: 30,000 lpd).

CHILLING CENTRES — Agar (10,000 lpd); Ashta (20,000 lpd); Betul (20,000 lpd); Bhopal (Under construction: 20,000 lpd); Bijawar (10,000 lpd); Bilaspur (10,000 lpd); Chapada (20,000 lpd); Daboh (20,000 lpd); Dhar (10,000 lpd); Gwalior (Under construction: 20,000 lpd); Harda (10,000 lpd); Jatara (20,000 lpd); Kantiwada (10,000 lpd); Mehgaon (20,000 lpd); Narsingarh (Under construction: 20,000 lpd); Ratlam (10,000 lpd); Sagar (Under construction: 10,000 lpd); Shivpuri (20,000 lpd).

Maharashtra

CHITALE BROS, 777 Sadashiv Peth, Poona 411030; Ph: 43028, 441990. Plant: Bhilawadi, Dist Sangli.

• • • • •
DAIRY DEVELOPMENT COMMISSIONER'S OFFICE, Maharashtra State, New Administrative Bldg, Abdu Gafarkhan Rd, Worli Seaface, Worli, Bombay 400018; Ph: 4937087, 4935929, Gram: Dairydevcom; Dairy Dev Commissr: Navin Kumar, IAS, Ph: 4931571. MILK PLANTS — Government Milk Schemes — Ahmednagar: Plot 10-B/2 MIDC Area, -414111; Ph: 101, 102; Gen Mgr: G V Kulkarni; Inst Cap: 130,000 lpd; Akola: Ph: 5373; Dairy Mgr: D V Chandorkar, Ph (resi): 5446; Inst Cap: 50,000 lpd; Amravati: 53 Congress Nagar; Ph: 2660; Dairy Mgr: D G Chiddarwar; Inst Cap: 50,000 lpd; Aurangabad: Kranti Chowk, Jalna Rd; Ph: 5529; Dairy Mgr: K K Vetal, Ph (resi): 4012; Inst Cap: 50,000

lpd; Beed: Barshi Rd; Ph: 565; Gen Mgr: R B Mohekar, Ph (resi): 643; Inst Cap: 100,000 lpd; Bhoom: Dist Osmanabad; Ph: 41; Dairy Mgr: A D Patil, Ph (resi): 42; Inst Cap: 50,000 lpd; Bombay: Greater Bombay Milk Scheme, Abdul Gararkhan Rd, Worli Seaface, Worli, -400018; Ph: 4937179; Gen Mgr: N D Kotnis. PLANTS — (i) Central Dairy, Aarey, Aarey Milk Colony, Goregaon, Bombay 400065; Ph: 692211, 684705; Dairy Mgr: Vacant; Inst Cap: 250,000 lpd; (ii) Mother Dairy, Kurla, Bombay 400024; Ph: 524330; Dairy Mgr (i/c): S B Kher; Inst Cap: 400,000 lpd; (iii) Worli Dairy, Worli Seaface, Bombay 400018; Ph: 4937378; Dairy Mgr (i/c): M J Daniel; Inst Cap: 450,000 lpd. Combined Av Thput: 10,21,000 lpd; Chalisgaon: Dhule Rd, Dist Jalgaon; Ph: 206; Dairy Mgr: D J Girase, Ph (resi): 95; Inst Cap: 20,000 lpd; Chandrapur: Ph: 3149; Dairy Mgr: N M Bagwan; Inst Cap: 20,000 lpd; Chiplun: Kherdi, Chiplun, Dist Ratnagiri; Ph: 136; Dairy Mgr: V N Hasabnis, Ph (resi): 161; Inst Cap: 40,000 lpd; Dhule: Central Dairy, Chakkar Bardi Rd; Ph: 549; Gen Mgr: P N Petkar, Ph (resi): 137; Inst Cap: 200,000 lpd; Gondia: PB No 30, Gondia, Dist Bhandra; Ph: 2954; Dairy Mgr: A K Karambhe, Ph (resi): 3062; Inst Cap: 20,000 lpd; Kankavli: Dist Sindhudurg; Ph: 24, 49; Dairy Mgr: A K Patki, Ph (resi): 47; Inst Cap: 20,000 lpd; Khapoli: Khalapur, -410203, Dist Raigad; Ph: 492; Dairy Mgr: S K Amale; Mahabaleshwar: Dist Satara; Ph: 335; Dairy Mgr: J S Mali; Mahad: Kalpana Bldg, Nawanagar, Near S T Station, Mahad, Dist Raigad; Ph: 76, 176; Dairy Mgr: A L Sankhe, Ph (resi): 77; Inst Cap: 20,000 lpd; Miraj: Dist Sangli; Ph: 2693; Gen Mgr: D A Kohak, Ph (resi): 2694; Inst Cap: 200,000 lpd; Nagpur: Seminary Hills; Ph: 32146, 24609; Gen Mgr: N J Pise, Ph (resi): 23259; Inst Cap: 200,000 lpd; Nanded: Behind Kalamandir, Opp Rajesh Hotel; Ph: 2196; Gen Mgr (i/c): N N Thipse; Inst Cap: 100,000 lpd; Nandura: Dist Buldhana; Ph: 8; Dairy Mgr: R K Joglekar, Ph (resi): 122; Inst Cap: 50,000 lpd; Nashik: Trimbak Rd; Ph: 72849; Dairy Mgr (i/c): A S Mhaske, Ph (resi): 72112; Inst Cap: 50,000 lpd; Parbhani: MIDC Area, Koregaon, Basamat Rd, -431401; Ph: 537; Dairy Mgr: S M Asodekar, Ph (resi): 524; Inst Cap: 50,000 lpd; Pune: Near Mari Aai Gate Police Station,

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-411003; Ph: 50451; Gen Mgr: S S Sawant, Ph (resi): 55016; Inst Cap: 150,000 lpd; Ratnagiri: Udyam Rd No 2, -415612; Ph: 2282; Dairy Mgr: D B Kashalkar; Inst Cap: 20,000 lpd; Satara: C-3 MIDC Area; Ph: 3145; Dairy Mgr: S D Deshmukh; Inst Cap: 50,000 lpd; Solapur: Vaijapur Rd, Near Dak Bunglow, -413003; Ph: 6591; Dairy Mgr: A S Kalgaonkar, Ph (resi): 6550; Inst Cap: 75,000 lpd; Udgir: Near S T Stand, Udgir, Dist Osmanabad; Ph: 92, 72; Gen Mgr: R B Ahire, Ph (resi): 191; Inst Cap: 120,000 lpd; Wardha: Sewagram Rd, -442001; Ph: 2897; Dairy Mgr: Ramesh Kharabe; Inst Cap: 50,000 lpd; Wani: Tal Dindori, Dist Nashik; Ph: 79; Dairy Mgr: S P Jadhav, Ph (resi): 84; Inst Cap: 20,000 lpd; Yeotmal: Dairy Mgr: S G Joshi. GOVT CHILLING CENTRES (Installed capacity indicated in brackets) — Ahmednagar Dist: Brahminwada, Tal Akola (4,000 lpd); Jamkhed (20,000 lpd); Karjat (10,000 lpd); Narayan Garhan, Tal Parner (16,000 lpd); Rajur, Tal Pathardi (8,000 lpd), Tisgaon, Tal Pathardi (20,000 lpd); Akola Dist: Washim (10,000 lpd); Amravati Dist: Morshi (5,000 lpd); Paratwada (5,000 lpd); Aurangabad Dist: Kannad (10,000 lpd); Sillod (5,000 lpd); Vaijapur (5,000 lpd); Beed Dist: Aasti (Kada) (10,000 lpd); Ambejogai (20,000 lpd); Patoda (4,000 lpd); Bhandara Dist: Bhandara (20,000 lpd); Kohmaro, Tal Gondia (5,000 lpd); Tumsar, Tal Gondia (5,000 lpd); Buldhana Dist: Chikhali (10,000 lpd); Khamgaon (5,000 lpd); Motala (5,000 lpd); Chandrapur Dist: Nagbhid (5,000 lpd); Gadchiroli Dist: Allapalli, Tal Shironacha (5,000 lpd); Kanheri (5,000 lpd); Jalgaon Dist: Chalisgaon (15,000 lpd); Latur Dist: Ahmedpur (4,000 lpd); Ausa (4,000 lpd); Nilanga (10,000 lpd); Nagpur Dist: Mansar, Tal Ranitek (9,000 lpd); Nanded Dist: Bhokar (4,000 lpd); Kinwat (4,000 lpd); Loha (4,000 lpd); Narasi (10,000 lpd); Nashik Dist: Chandwad (10,000 lpd); Osmanabad Dist: Naldurg, Tal Kalamb (4,000 lpd); Osmanabad (10,000 lpd); Paronda (10,000 lpd); Umarga (4,000 lpd); Yermala, Tal Kalamb (4,000 lpd); Parbhani Dist: Gangakhed (4,000 lpd); Higoli (4,000 lpd); Pune Dist: Baramati (30,000 lpd); Indapur (4,000 lpd); Induri, Tal Mawal (10,000 lpd); Mahabaleshwar, Tal Wai (10,000 lpd); Nasarapur, Tal Bhor (4,000 lpd); Otur, Tal Junnar (10,000 lpd); Raigad Dist: Khopoli, Tal

Khalapur (20,000 lpd); Mahad (20,000 lpd); Roha (4,000 lpd); Ratnagiri Dist: Lanja (5,000 lpd); Ratnagiri (10,000 lpd); Sadawali, Tal Sangmeshwar (5,000 lpd); Sangli Dist: Jat (10,000 lpd); Kadegaon, Tal Khalapur (20,000 lpd); Shirala (10,000 lpd); Satara Dist: Pargaon, Tal Khandala (10,000 lpd); Phaltan (20,000 lpd); Waduj, Tal Khatau (10,000 lpd); Sindhudurg Dist: Kankavali (10,000 lpd); Kolgaon, Tal Sawantwadi (5,000 lpd); Solapur Dist: Akluj, Tal Malshiras (50,000 lpd); Barshi (20,000 lpd); Pandharpur (20,000 lpd); Sangola (4,000 lpd); Thane Dist: Dapchhari, Tal Dahanu (20,000 lpd); Saralagaon, Tal Murbad (10,000 lpd); Wada (5,000 lpd); Wardha Dist: Karanja (4,000 lpd); Samudrapur, Tal Hinganghat (5,000 lpd); Yeotmal Dist: Maregaon (5,000 lpd); Pandharkawada (5,000 lpd); Pusad (4,000 lpd); Yeotmal (10,000 lpd).

MAHARASHTRA RAJYA SAHAKARI DUDH MAHASANGH MARYADIT, NKM International House, West Wing, 3rd Floor, 178 Backbay Reclamation, Babubhai M Chinoy Marg, Bombay 400020; Ph: 2024529, Gram: Cofedmilk; Mg Dir: R G Bansod, IAS. MILK PLANTS — Bombay: Mahanand Dairy, Opp New Standard Engineering Works, Western Express Highway, Goregaon (East), -400065; Ph: 687577, 687581, 687598, Gram: Cofedmilk; Gen Mgr: S A Sawant, Ph off: 687580, resi: 687589. Inst Cap: 400,000 lpd; Jalgaon: Jalgaon Zilla Sahakari Dudh Utpadak Sangh Maryadit, PB No 32, Erandol Naka, -425001; Mg Dir: Dr D K Toke; Inst Cap: 200,000 lpd, Av Thput: 219,000 lpd; Kolhapur: Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd, B-1 MIDC Area, Gokulshirgaon, Tq Karvir, Dist Kolhapur; Mg Dir: S R Khadye; Inst Cap: 200,000 lpd, Av Thput: 197,000 lpd; Pune: Pune Zilla Sahakari Dudh Utpadak Sangh Maryadit, Katraj Dairy, Pune-Satara Rd, -411046; Mg Dir: R L Meher; Inst Cap: 50,000 lpd, Av Thput: 64,000 lpd.

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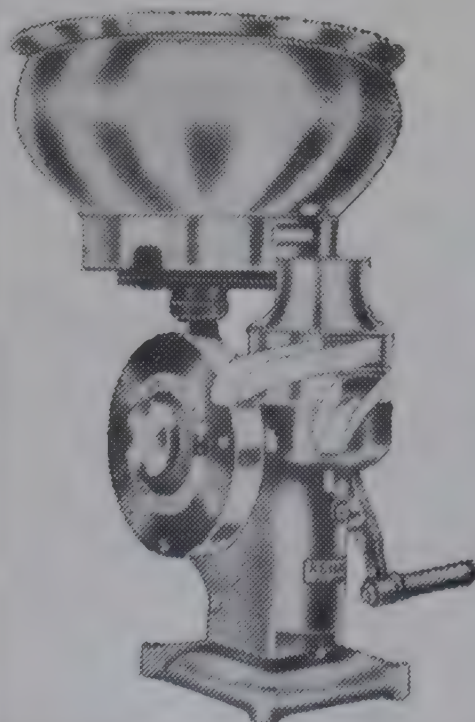
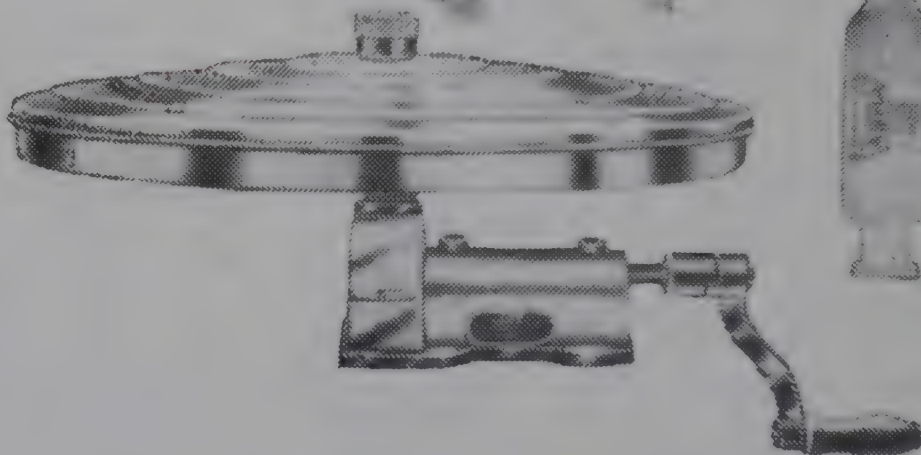
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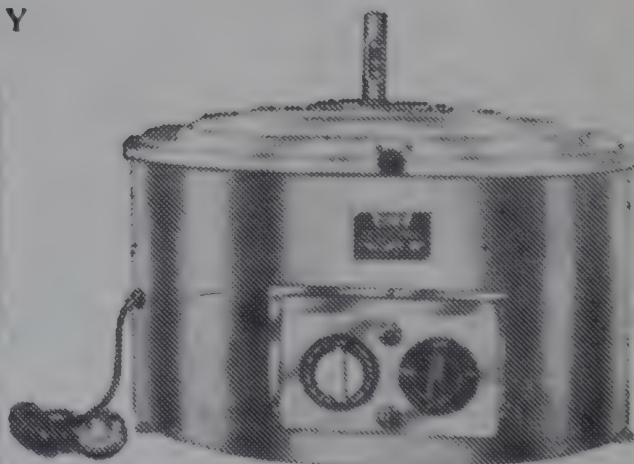
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SKIMMING CAPACITY
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SIZE	LITERS
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A.S. 10	225
A.S. 11	300
A.S. 12	400
A.S. 13	550



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 FACTORY: B-120, MAYAPURI, PHASE I, NEW DELHI-110064. PHONE: 537801

Manipur

GOVERNMENT OF MANIPUR -- Milk Plant --
Imphal: Inst Cap: 6,000 lpd, Av Thput: 4,000 lpd.

Orissa

ORISSA STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, D-2 Sahid Nagar, Bhubaneswar 751007; Ph: 52273, 54573, Gram: Omfed, Tlx: 0675-218; Mg Dir: Ujal Singh Bhatia, IAS. MILK PLANTS -- Bhubaneswar: At Chandrasekhapur; Mgr: S C Kar, Ph off: 55351, resi: 53909; Inst Cap: 60,000; Rourkela (Under construction): Inst Cap: 30,000 lpd; Sambalpur (Under construction): Inst Cap: 20,000 lpd. CHILLING CENTRES (Installed capacity indicated in brackets) -- Anandpur (2,000 lpd); Angul (2,000 lpd); Athagarh (2,000 lpd); Bargarh (5,000 lpd); Chiplima (2,000 lpd); Dhenkanal (10,000 lpd); Jaipur (1,000 lpd); Jharsuguda (2,000 lpd); Kalahandi (10,000 lpd); Kendrapara (2,000 lpd); Keonjhar (10,000 lpd); Nayagarh (2,000 lpd); Nimapara (4,000 lpd); Paikadahikora (10,000 lpd); Silisuan (10,000 lpd); Tirtol (6,000 lpd).

Pondicherry

PCNDICHERY COOPERATIVE MILK PRODUCERS' UNION LIMITED, Pondicherry Dairy Plant, Kurumampet, Muthirapalayam, Pondicherry 605010; Ph: 4505, Gram: Comilk; Mg Dir: K Parasuraman, Ph (resi): 5901. Inst Cap: 30,000 lpd.

Punjab

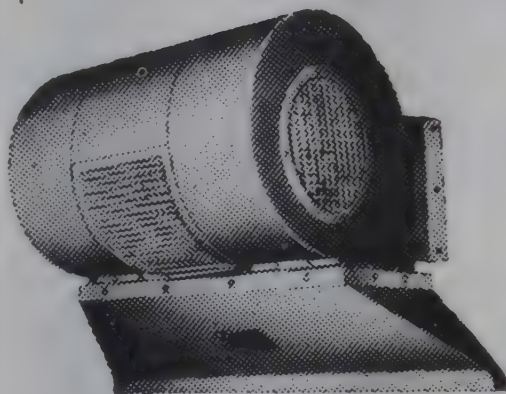
PUNJAB STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, SCO No 3015-3018, Sector 22-D, Chandigarh 160022; Ph: 20715, 29667, 27224, 31995, 31996, Gram: Milkfed;

Mg Dir: A S Sodhi, IAS. MILK PLANTS --
Amritsar: Gen Mgr: S S Bhullar, Ph off: 52955, resi: 42297; Inst Cap: 60,000 lpd; Bhatinda: Dabwali Rd, -151001; Ph: 2825, 2808, Gram: Milk; Gen Mgr: S S Bagga, Ph off: 2679, resi: 3353; Inst Cap: 60,000 lpd; Chandigarh: Industrial Area, -160002; Gen Mgr: D B Doda, Ph off: 27853, 26227, resi: 29515; Gurdaspur: Gen Mgr: Dr Nirbhan Singh, Ph off: 787, resi: 752; Hoshiarpur: Gen Mgr: K K Bali, Ph: 2822, resi: 3157; Inst Cap: 60,000 lpd; Jalandhar: Doaba Milk Plant; Gen Mgr: Amrik Singh, Ph off: 74730, resi: 75650; Inst Cap: 45,000 lpd; Ludhiana: Gen Mgr: Jaswant Singh, Ph off: 29054, resi: 27783; Inst Cap: 100,000 lpd; Mohali: Gen Mgr: S K Malhotra, Ph off: 87412, 87782-84, resi: 87662; Inst Cap: 60,000 lpd; Patiala: Gen Mgr: Capt H S Oberoi, Ph off: 75703, resi: 76178; Sangrur: Gen Mgr: B M L Garg, Ph off: 2358, resi: 2376; Inst Cap: 45,000 lpd. CHILLING CENTRES (Installed capacity indicated in brackets) -- Amritsar Dist: Fategarh Churian (10,000 lpd); Khadoor Sahib (8,000 lpd); Lopoke (10,000 lpd); Mehta (8,000 lpd); Patti (8,000 lpd); Bhatinda Dist: Bhikhi (10,000 lpd); Rampura (10,000 lpd); Sardulgarh (10,000 lpd); Faridkot Dist: Badal (10,000 lpd); Bajakhana (10,000 lpd); Doda (10,000 lpd); Ferozepur Dist: Ghallu (20,000 lpd); Talwandi Bhai (HIF) (20,000 lpd); Gurdaspur Dist: Gurdaspur (30,000 lpd); GHO (5,000 lpd); Kalanaur (6,000 lpd); Narot Jaimal Singh (10,000 lpd); Tugaiwala (6,000 lpd); Hoshiarpur Dist: Balachaur (10,000 lpd); Dasuya (20,000 lpd); Pairana (5,000 lpd); Jalandhar Dist: Khatkar Kalan (40,000 lpd); Shahkot (20,000 lpd); S P Lodhi (20,000 lpd); Ludhiana Dist: Bija (4,000 lpd); Machhiwara (2,000 lpd); Raikot (4,000 lpd); Ramgarh Sardaran (4,000 lpd); Mohali Dist: Morinda (20,000 lpd); Nurpur Bedi (5,000 lpd); Patiala Dist: Patiala (30,000 lpd); Samana (8,000 lpd); Sandhaur Dist: Changliwala (10,000 lpd); Sandhaur (2,500 lpd); Sangrur Dist: Jore Pul (5,000 lpd); Mahal Kalan (5,000 lpd); Sehna (10,000 lpd).

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Rajasthan

RAJASTHAN COOPERATIVE DAIRY FEDERATION LTD,
Saras Sankul, Jaipur 302017; Ph: 78791,
Gram: Dairyfed, Tlx: 365-272 RCDF IN;
Mg Dir: N K Varma, IAS. MILK PLANTS --
Ajmer: Gen Mgr: S K Miglani, Ph off:
20152, resi: 21410; Inst Cap: 100,000
lpd, Av Thput: 50,000 lpd; Alwar: Mgr:
C K Rai, Ph off: 3626, 3374, resi: 3646;
Inst Cap: 100,000 lpd, Av Thput: 65,000
lpd; Bhilwara: Mgr: R Bhatia, Ph off:
27016, resi: 26068; Inst Cap: 100,000
lpd, Av Thput: 28,000 lpd; Bikaner: Mgr:
D N Behal, Ph off: 4930, resi: 4969;
Inst Cap & Av Thput: 150,000 lpd; Hanu-
mangarh (Under construction): Dep Mgr:
D D Verma; Inst Cap: 100,000 lpd; Jaipur:
Gen Mgr: P K Garg, Ph off: 73888, 68781,
resi: 78107; Inst Cap: 150,000 lpd, Av
Thput: 80,000 lpd; Jodhpur: Mgr: R K
Singh, Ph off: 22913, 23404, resi: 22436;
Inst Cap: 100,000 lpd, Av Thput: 150,000
lpd; Kota: Mgr: P N Wali, Ph off: 26659,
resi: 26955; Inst Cap: 25,000 lpd; Rani-
wara: Mgr: S K Chopra, Ph off: 58; Inst
Cap: 60,000 lpd; Udaipur: Mgr: N K Gupta,
Ph off: 25458, resi: 24779; Inst Cap:
25,000 lpd, Av Thput: 50,000 lpd.
CHILLING CENTRES (Installed capacity
indicated in brackets) -- Bajju (10,000
lpd); Balotra (20,000 lpd); Banswara
(10,000 lpd); Barmer (10,000 lpd); Beawar
(10,000 lpd); Chattargarh (10,000 lpd);
Dausa (20,000 lpd); Dungargarh (10,000
lpd); Dungarpur (10,000 lpd); Gangapur-
city (20,000 lpd); Kotputli (20,000 lpd);
Lunkaransar (30,000 lpd); Malpura (20,000
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(10,000 lpd); Nohar (10,000 lpd); Pali
(20,000 lpd); Phalana (20,000 lpd); Pha-
lodi (10,000 lpd); Pokaran (20,000 lpd);
Sardarsahar (20,000 lpd); Suratgarh
(20,000 lpd); Tijara (20,000 lpd); Vijay-
nagar (20,000 lpd).

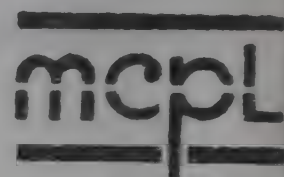
Sikkim

SIKKIM COOPERATIVE MILK PRODUCERS UNION LTD,
Tadong, Gangtok 737012; Ph: 2463; Mg Dir:
P D Rai; Dairy Mgr: S K Dutta. Milk Plant:
Gangtok; Inst Cap: 10,000 lpd.

Tamil Nadu

TAMILNADU COOPERATIVE MILK PRODUCERS' FEDER-
ATION LIMITED, Aavin Illam, Madhavaram
Milk Colony, Madras 600051; Ph: 575531-
35, Gram: Aavin, Tlx: 041-217; Mg Dir: V
Karuppan, IAS, Ph: 575122; Gen Mgr: M H
Jalal, IAS, Ph: 652064. MILK PLANTS --
Ambattur (Madras): Inst Cap: 300,000 lpd,
Prop Cap: 400,000 lpd; Ayyanavaram (Mad-
ras): Inst Cap: 12,000 lpd; Coimbatore:
Inst Cap: 30,000 lpd, Prop Cap: 150,000
lpd; Erode (Periyar): 150,000 lpd, Prop
Cap: 300,000 lpd; Kakkulur (Chengleput):
Prop Cap: 50,000 lpd; Karaikudi (Ramnad):
Prop Cap: 50,000 lpd; Kodaikanal (Anna):
Inst Cap: 10,000 lpd; Krishnagiri (Dharma-
puri): Inst Cap: 100,000 lpd, Prop Cap:
200,000 lpd; Madhavaram: Inst Cap: 125,000
lpd, Prop Cap: 175,000 lpd; Madurai: Inst
Cap: 150,000 lpd, Prop Cap: 200,000 lpd;
Nagercoil: Inst Cap: 16,000 lpd, Prop Cap:
50,000 lpd; Salem: Inst Cap: 100,000 lpd,
Prop Cap: 200,000 lpd; Thanjavur: 20,000
lpd, Prop Cap: 100,000 lpd; Tirunelveli:
Inst Cap: 50,000 lpd; Udhagamandalam
(Nilgiris): Inst Cap: 50,000 lpd. CHILLING
CENTRES -- Anna Dist: Dindugal (30,000
lpd); Palani (10,000 lpd); Chengalpattu
Dist: Acharapakkam (10,000 lpd); Balu-
chettichatram (10,000 lpd), Maduranthagam
(Prop Cap: 50,000 lpd), Thiruvallur
(50,000 lpd); Coimbatore Dist: Shanmuga-
puram (10,000 lpd); Sultanpettai (10,000
lpd); Thiruppur (20,000 lpd); Dharmapuri
Dist: Denkanikottai (4,000 lpd); Harur
(40,000 lpd); Kanyakumari Dist: Martandam
(3,000 lpd); Madurai Dist: Theni (20,000
lpd); Nilgiris Dist: Gudalur (4,000 lpd);
Kotagiri (4,000 lpd); Vazhiathottam (4,000
lpd); North Arcot Dist: Ambur (30,000 lpd);
Anakavur (30,000 lpd); Arakkonam (Prop
Cap: 30,000 lpd); Thiruvannamalai (30,000
lpd); Periyar Dist: Sankarandanpalayam
(30,000 lpd); Sathiamangalam (30,000 lpd);
Pudukottai: (10,000 lpd); Ramnad Dist:
Kamuthi (Prop Cap: 10,000 lpd); Parama-
kudi (4,000 lpd), Srivilliputhur (10,000
lpd); Thirupathur (4,000 lpd); Virudhu-
nagar (10,000 lpd); Salem Dist: Attur
(50,000 lpd); Mettur (Prop Cap: 50,000
lpd); Namakkal (30,000 lpd); Paramathi-
vellur (50,000 lpd); South Arcot Dist:
Chinnasalem (30,000 lpd); Sethiathope
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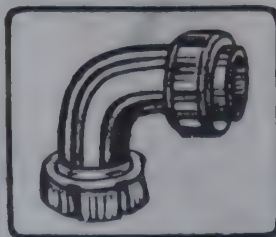
PHONE: 324758

GRAM: MODIBROSCO

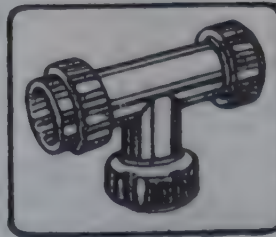
UNION



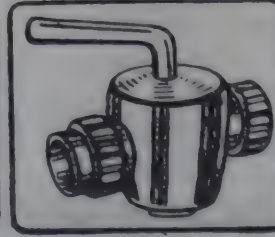
BEND



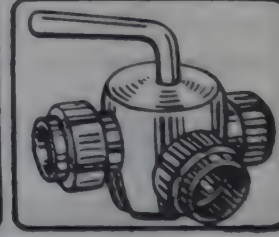
TEE



2-WAY



3-WAY



Villupuram (30,000 lpd); Thanjavur Dist: Mannarkudi (4,000 lpd); Myladuthurai (Prop Cap: 20,000 lpd); Pattukottai (Prop Cap: 20,000 lpd); Tirunelveli Dist: Ettaiyapuram (Prop Cap: 10,000 lpd); Sankarankoli (14,000 lpd); Valliyur (Prop Cap: 20,000 lpd); Trichy Dist: Jayamkondar (4,000 lpd); Karur (4,000 lpd); Prambalur (4,000 lpd).

Tripura

TRIPURA COOPERATIVE MILK PRODUCERS UNION LIMITED, Agartala Dairy, Indranagar, Agartala 799006, Tripura West; Ph: 3524, 3801; Mg Dir: J L Kar; Gen Mgr: M L Chakraborty. Inst Cap: 10,000 lpd.

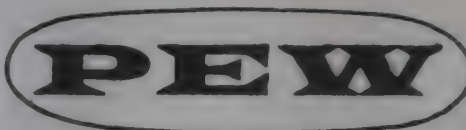
Uttar Pradesh

UPRADESHIK COOPERATIVE DAIRY FEDERATION LTD, 29 Park Rd, Lucknow 226001; Ph: 44401, Gram: Dairyfed, Tlx: 0535-285; Mg Dir: V K Sharma, IAS; Chief Gen Mgr: Nav Tej Singh, IAS. MILK PLANTS -- Agra: Agra Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 10,000 lpd, Av Thput: 9,468 lpd; Allahabad: Allahabad Sahakari Milk Board Ltd; Inst Cap: 20,000 lpd, Av Thput: 16,507 lpd; Almora: Almora Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 5,000 lpd, Av Thput: 237 lpd; Azamgarh: Azamgarh Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd, Av Thput: 22 lpd; Bareilly: Bareilly Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 10,000 lpd, Av Thput: 3,434 lpd; Bijnore: Bijnore Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd; Dehra Dun: Dehra Dun Utpadak Sahakari Sangh Ltd; Inst Cap: 20,000 lpd, Av Thput: 2,315 lpd; Faizabad: Saket Dairy, Ayodhya Rd; Gen Mgr: S N Susari; Inst Cap: 20,000 lpd, Av Thput: 2,640 lpd; Farukhabad: Farukhabad Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd; Garhwal: Kotdwar Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 2,000 lpd, Av Thput: 90 lpd; Gorakhpur: Gorakhpur Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 10,000 lpd, Av Thput: 2,038 lpd; Jalaun: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd,

Av Thput: 107 lpd; Jaunpur: Jaunpur Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd, Av Thput: 32 lpd; Kanpur: Kanpur Sahakari Milk Board Ltd, Nirala Nagar, Juhi, Kanpur; Inst Cap: 50,000 lpd, Av Thput: 27,769 lpd; Lucknow: Lucknow Milk Producers Coop Union Ltd, Jopling Rd; Gen Mgr: R C Pandey; Inst Cap: 40,000 lpd, Av Thput: 39,064 lpd; Mathura: Mathura Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 10,000 lpd, Av Thput: 4,701 lpd; Meerut: Feeder Balancing Dairy, Partapur, Gangol Rd; Gen Mgr: O P Yadav; Inst Cap: 100,000 lpd, Av Thput: 90,000 lpd; Nainital: Lal Kuan Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 20,000 lpd, Av Thput: 4,648 lpd; Pithoragarh: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 2,000 lpd, Av Thput: 63 lpd; Pratapgarh: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd, Av Thput: 65 lpd; Rae Bareilly: Rae Bareilly Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd, Av Thput: 3,181 lpd; Shahjahanpur: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd; Sitapur: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd; Unnao: Dugdh Utpadak Sahakari Sangh Ltd; Inst Cap: 4,000 lpd; Varanasi: Feeder Balancing Dairy, Ram Nagar, Industrial Area; Gen Mgr: V K Tiwari; Inst Cap: 100,000 lpd, Av Thput: 35,225 lpd.

West Bengal

DIRECTORATE OF DAIRY DEVELOPMENT, Govt of West Bengal, 23A Netaji Subhash Rd, 9th Floor, Calcutta 700001; Ph: 204535/6, Gram: Dairycal; Milk Commissr: J P Pal. MILK PLANTS -- Burdwan: Dairy Mgr: B Das; Proj Offr: A Sen; Inst Cap: 20,000 lpd, Av Thput: 8,000 lpd; Calcutta: (i) Central Dairy, 64/99 Belgachia Rd, -700037; Ph: 528181, 528081, 528131, 528231; Dep Dairy Mgr: A K Ghosh; Dairy Engr: B Sengupta; (ii) Central Dairy, Haringhata; Ph: Kalyani-623, 430, 432; Combined Inst Cap: 300,000 lpd, Av Thput: 210,000 lpd; Durgapur: Dairy Mgr: S Mukherjee; Inst Cap: 50,000 lpd, Av Thput: 9,000 lpd; Krishnagar: Proj Offr: R C Kansabanik; Inst Cap: 20,000 lpd (Installed on Jan 14, 1987).



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MOTHER DAIRY CALCUTTA (Managed by the National Dairy Development Board), PO Chakundi 712702, Dist Hboghly; Ph: 643575, 643578, 643579, 643182/3, Gram: Mother-dairy, Chanditala, Tlx: 021-2919 MILK IN; Gen Mgr: N A Shaikh. Inst Cap: 400,000 lpd, Av Thput: 345,000 lpd.

WEST BENGAL COOPERATIVE MILK PRODUCERS' FEDERATION LTD., Block AE-387, Sector I, Salt Lake, Bidhan Nagar, Calcutta 700064; Ph: 374840, Gram: Benmilk; Mg Dir: H P Roy, IAS. **MILK PLANTS — Berhampore:** Feeder Balancing Dairy, Dist Murshidabad; Inst Cap: 60,000 lpd; **Matigara:** Himalayan Cooperative Milk Producers' Union Ltd, Matigara 734428, Dist Darjeeling; Ph: 22512, 22681 (Siliguri Ex), 2257 (Darjeeling Ex), Gram: Himul; Chief Exec. Offr: R Mutsuddi; Inst Cap: 100,000 lpd.

Using the Yearbook

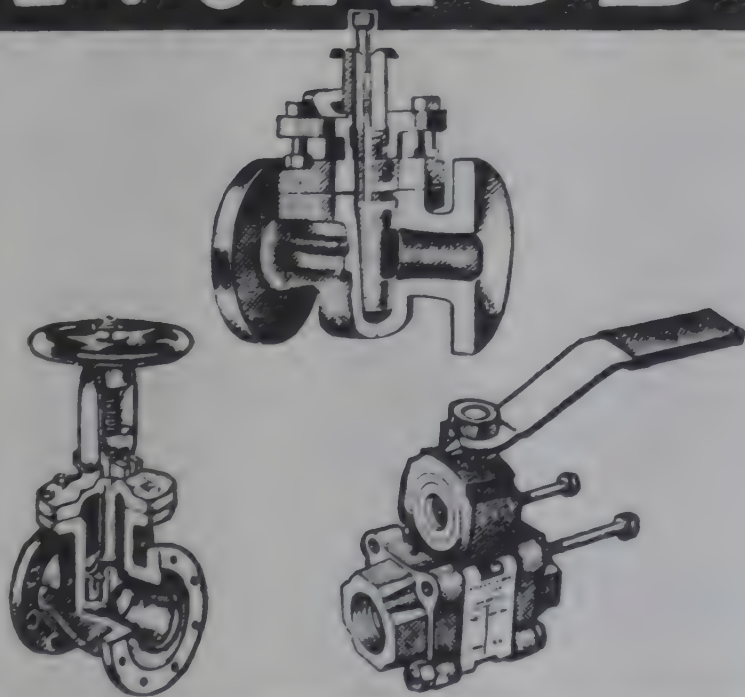
You will be surprised at the many, varied ways in which this YEARBOOK can be used by you. A handy databook-cum-directory, it is classified conveniently for quick, easy reference.

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2. Indian Journal of Dairy Science

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Annual Subscription: Inland: Rs 100; Overseas: \$50.00

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- (iii) Dairying in India—1982: Rs. 25 plus Rs. 5 postage
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- (v) Dairying in India—1984: For IDA Members Rs. 10 plus Rs. 5 postage
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Periodicals

National

- BAIF JOURNAL, THE.** Quarterly. English. Editor: Dr D S Gorhe. Pub: Bharatiya Agro-Industries Foundation, Kamdhenu, Senapati Bapat Marg, Pune 411016; Ph: 52621.
- CLFMA LINK, Quarterly.** English and **CLFMA NEWSLETTER.** Monthly. English. Editor: K M Rao. The Compound Livestock Feeds Manufacturers' Association of India, 111 Mittal Chamber, 228 Nariman Point, Bombay 400021; Ph: 2026103.
- DAIRY GUIDE.** Quarterly. English. Chief Editor: C P Narang, 20 Thyag Raj Nagar Market, New Delhi 110003; Ph: 621018, 622278.
- DAIRY INDIA.** Annual. English. Editor & Publisher: P R Gupta, A-25 Priyadarshini Vihar, Delhi 110092; Ph: 2243326, 2243039.
- DAIRYING IN INDIA.** Annual. English. Chief Editor: Dr B K Chakraborty. Pub: Indian Dairy Association, IDA House, R K Puram, New Delhi 110022; Ph: 670781, 674719.
- INDIAN DAIRYMAN.** Monthly. English. Chief Editor: Dr B K Chakraborty; Editor: S D Burde. Pub: Indian Dairy Association, Sector IV, R K Puram, New Delhi 110022; Ph: 670781, 674719.
- INDIAN FOOD PACKER.** Bi-monthly. English. Chief Editor: Dr A G Naik-Kurade. Pub: All India Food Preservers' Association, 206 Aurobindo Place, Hauz Khas, New Delhi 110016; Ph: 660860.
- INDIAN JOURNAL OF ANIMAL GENETICS & BREEDING.** Half-yearly. English. Editor: Dr R Nagarcenkar. Pub: Indian Soc of Animal Genetics & Breeding, Room No 109, Krishi Bhawan, New Delhi 110001; Ph: 382545.
- INDIAN JOURNAL OF ANIMAL NUTRITION.** Quarterly. English. Chief Editor: Dr B N Gupta; Editor: Dr T Prasad. Pub: Animal Nutrition Society of India, NDRI, Karnal.
- INDIAN JOURNAL OF ANIMAL SCIENCES, THE.** Monthly. English. Editor: R R Lokeshwar. Pub: ICAR, Krishi Anusandhan Bhawan, New Delhi 110012; Ph: 5721004.
- INDIAN JOURNAL OF DAIRY SCIENCE.** Quarterly. English. Chief Editor: Dr B K Chakraborty. Pub: Indian Dairy Association,

Sector IV, R K Puram, New Delhi 110022; Ph: 670781, 674719.

- INDIAN VETERINARY JOURNAL, THE.** Monthly. English. Editor: Dr V S Alwar. Pub: Indian Veterinary Association, 7 Chambers Rd, Madras 600035; Ph: 451006.
- LIVESTOCK ADVISER.** Monthly. English. Editor: Dr R S Rafiuddin. Pub: T A Gaffar, 97 St John's Church Rd, Bangalore 560005; Ph: 561627; resi: 576243.
- MILCOW.** Quarterly. English & Tamil. Editor: Prof M E Doraiswamy. Pub: Dairy Herd Improvement Assn, 6 Viswesvarapuram, Madras 600018; Ph: 77444.

Foreign

- ASIAN LIVESTOCK.** Monthly. English. Editor: Dr B K Soni. Pub: Animal Production and Health Commission for Asia, the Far East and the South-West Pacific (APHCA), c/o FAO Regl Office, Maliwan Mansion, Phra Atit Rd, Bangkok 10200, Thailand.
- DAIRY HERD MANAGEMENT** Monthly. English. Editorial Dir: George Ashfield. Pub: Miller Publishing Co, 2501 Wayzata Blvd, PB 67, Minneapolis, Minn 55440, USA; Ph: 612374-520.
- DAIRY INDUSTRIES INTERNATIONAL.** Monthly. English. Mg Editor: Dina Chase; Editor: Pauline Russel. Pub: United Trade Press Ltd, 33/35 Bowling Green Lane, London EC1R 0DA; Ph: 01-837 1212.
- DAIRY SCIENCE ABSTRACTS.** Monthly. English. Dir (Information Services): Dr J R Metcalfe. Pub: Commonwealth Bureau of Dairy Science & Technology, Lane End House, Shinfield, Reading RG2 9BB, UK; Ph: Reading (0734) 883895.
- MILK INDUSTRY.** Monthly. English. Editor: Ron Jefferies. Pub: National Dairymen's Assn, 19 Cornwall Terrace, London NW1 4QP, UK.
- MILK PRODUCER.** Monthly. Editor: Heather Rogers. Pub: Milk Marketing Board, Thames Ditton, Surrey KT7 0EL, UK.
- WORLD ANIMAL REVIEW.** Quarterly. English. Editor: C B Coulson. Pub: FAO, Via delle Terme di Caracalla, 00100 Rome, Italy.

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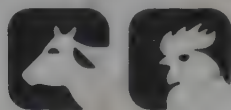
Pharmaceuticals

This list, arranged alphabetically, covers producers of pharmaceuticals, including feed supplements, mineral mixtures and allied products. Brand names of products are also indicated.

ACETO CHEMICALS PVT LTD, 22 Brabourne Rd, Calcutta 700001; Ph: 261583, Gram: Acetochem; Mg Dir: H K Gupta; Dir (Sales): V K Gupta. Product: Furazolidone, Nitrofurazone.

AGVET INDUSTRIES, 14-41/1 Prashant Nagar, Uppal, Hyderabad 500039; Ph: 852917, Gram: Agvet; Prop: Dr Y K Rao, Ph (resi): 72247. Brand Names: Ampivet, Amprocox, Be Ce Ke, Bicox, Coxyban, Coxymix, Erythrin, Liv-ton, Micron-P, Nitrovin Agvet, Nutribee, Nutrimix-K, Nutrimix-Spl, Piperazine, Tetravet, Thearsol, Vit-A-Sol, Vitramin Forte, Vitramin-N-Spl, Zincin, Zoltin.

ALARSIN, Pharmaceutical Div, Plot No A-32, Road No 3, MIDC, Opp ESIS Hospital, Andheri (E), Bombay 400093; Ph: 6324095, 6324226, Gram: Alarsin; Mg Dir: K V Patel. Brand Name: Aloes Compound, Bangshil, Fortege, Leptaden, Myron.



Alembic

ALEMBIC CHEMICAL WORKS CO LTD, Alembic Rd, Baroda 390003; Ph: 82631, 82961, Gram: Alembic, Tlx: 0175-201/301; Mg Dir: G G Pai; Mktg Mgr, Vet Products: Dr T G Chandramohan; Product Mgr (Vet): Dr Tapan Ray. Branches — Bangalore: Darshak Ltd, Bank Bldg, 11 Kempegowda Rd, -560009; Ph: 76232/3, Tlx: 0845-206; Field Sales Offr (Vet): Dr A K Abraham; Bombay: Paraan Ltd, 301 Udyog Mandir, No 1, 7C Pitamber Lane, Bhagoji, Keer Marg, Mahim, -400016; Ph: 456386/7, Tlx: 71061; Field Sales Offr (Vet): Dr Pawan Sood; Calcutta: Purak Vinimay Ltd, 225C Acharya J C Bose Rd, 4th Floor, -700020; Ph: 442695, 441487, Tlx: 3205; New Delhi: Ujjwal Ltd, Shashi Bldgs, 4/18 Asaf Ali Rd, -110002; Ph: 276728, 279730, Tlx: 031-2630; Field Sales Offr (Vet): Dr S P Chaudhry, Ph

(resi): 5434809. Products/Brand Names: Anthelmintics: Amizol sol powder; Antibacterial: Cotrimol bolus; Antibiotics: Alcyclin-O (Vet), Alcyclin Bolus, Baci-pen (Vet), Bistrepen (Vet), FPP (Vet); Feed Supplements: Bivinal sol powder, Promix-Y powder & tablets, Sharkoferrol (Vet); Specialities: Alcidlox, Algesin Inj, Ascal Inj, Bivinal Forte Inj, Zeet Inj.

ALVED PHARMACEUTICALS (P) LTD, 5 Chandra Bagh Avenue, Dr Radhakrishnan Rd, Madras 600004; Ph: 849449, 841513, Gram: Alved, Tlx: 41-7696 ALVI IN; Mg Dir: Dr A M Salahuddin; Mktg Dir: Dr S M Shoukathullah; Mktg Mgrs — South: Dr S Radhakrishnan, North: Dr A Shabuddin, East: Dr S K Dey. Branches — New Delhi: FA-36 Vishal Enclave, -110027; Vijayawada: 26-23-28 Sundaramma St, Gandhi Nagar, -520003. Brand Names: Aladazin, Alincomycin, Bactrisol, Dinofertin, Helmonil, Kentab, Lactivet, Nitromin-B, Niclex.

AN-CARE, 301 Chuchum, 82/1E Saraswati Rd, Santacruz (W), Bombay 400054; Ph: 539330; Chief Exec: Vasant Patel. Factory: Gujarat. Products: Tetran (Soluble powder), Alfa Zinc Bacitracin, PU 100.

AR-EX LABORATORIES PVT LTD, Botawala Bldg, 21 Sitaladevi Temple Rd, Mahim, Bombay 400016; Ph: 453576, Gram: Moloptic; Mg Dir: N V Gunjekar; Sales Mgr: Dr R S Pradhan. Brand Names: Bonyvet, Fertivet, Flukin, Moviom, Pivipol Pessary, Pivipol.

ARIES AGRO-VET INDUSTRIES PVT LTD, Plot No 24, Govandi (E), Post Bag No 1, Bombay 400043; Ph: 5519506, 5519575, Gram: Aries-agro; Mg Dir: Dr T B Mirchandani; Dir (Vet): Dr Jimmy Mirchandani, Ph (resi): 623241. Branches: Bangalore, Coimbatore, Hyderabad, Jalandhar, Kanpur.

AVET CHEMICALS PVT LTD, 7 Green Park, Jalandhar 144001; Ph: 2696, 2230, Gram: Avet; Mg Dir: Dr V S Abrol, Ph (resi): 2698. Branch: Hyderabad; Ph: 224417. Brand Names: Avet MM, Avimix, Avitin, Vetmin, Vetminforte.

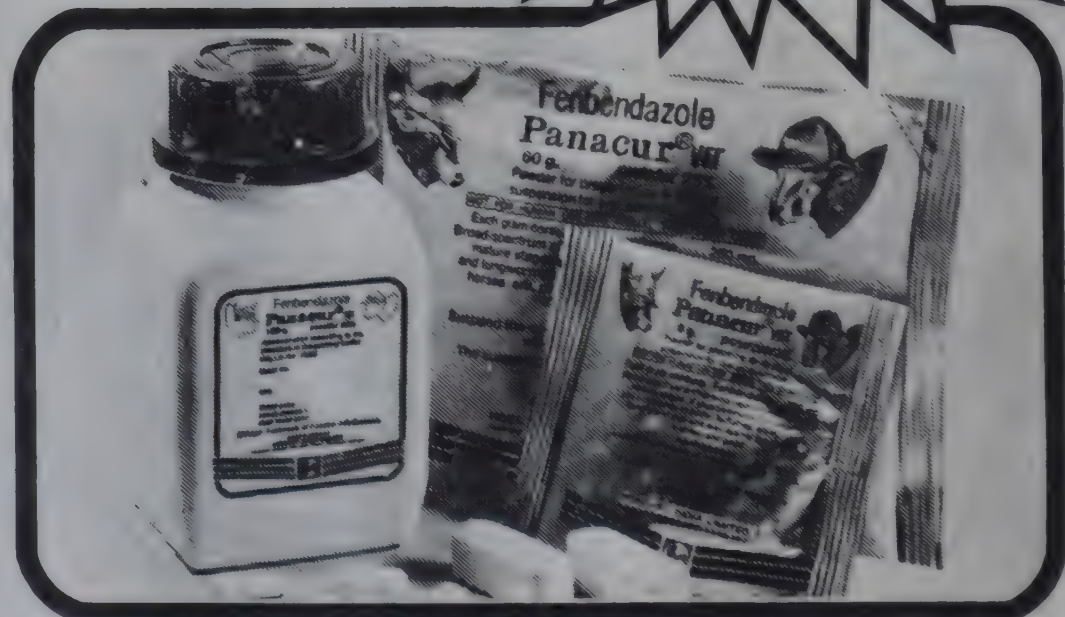
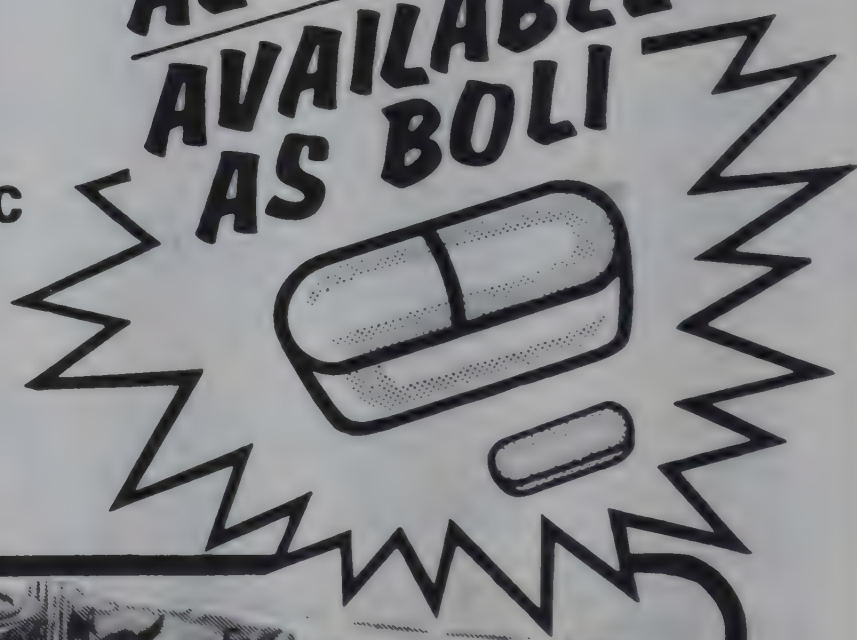
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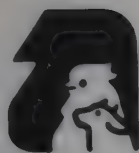


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**AVIPHARMA**

AVIPHARMA, 9 Satnam Sagar, Ground Floor, 20 Peddar Rd, Near Jaslok Hospital, Bombay 400026; Ph: 385138; Mg Partner: Avinash C Rangnekar, Ph (resi): 890419. Products/Brand Names: Avimin-C (Mineral Mixture), Avivit AD3 Premix (Vitamin AD3 Premix), Nutravi (Vitamin-cum-Trade Mineral Premix).

BASF INDIA LIMITED, Maybaker House, Sudam Kalu Ahire Marg, PO Box 19108, Bombay 400025; Ph: 4930703, Gram: Basfindia, Tlx: 11-71538 BASF IN, 11-71223 CIL IN; Mktg Mgr, Chemicals: J Salpekar. Branches -- Ahmedabad: Karaka Bldg No 1, Ashram Rd, Nawrangpura, -380009; Ph: 407074; Calcutta: 13-A Govt Place East, -700069; Ph: 233883, 235869; Madras: Garuda Bldg, 46 Cathedral Rd, -600086; Ph: 83562; New Delhi: 7 Basant Lok, Community Centre, Vasant Vihar, -110057; Ph: 677593, 677957, 677099. Factories: -- Bokaro: Phase IV, Bokaro Indl Area, Bokaro Steel City 827014; Ph: 6007, Tlx: 628-211; Thane: Plot No 12, Trans-Thana Creek Area, Turbhe, Thane-Belapur Rd, -400613; Ph: Vashi 681201, 681269, 681570, Tlx: 11-4464. Brand Names: Basfin, Lucatin CX, Luprosil, Lutavit.

BAAL GOPAL AGRO-VET & CHEMICAL INDUSTRIES PVT. LTD, 41 New Industrial Estate, Jagatpur, Cuttack 754021; Ph: 25373; factory: 13239; Mg Dir: Rahas Behari Mohanty; Hon Adviser: Dr N C Panda. Regd Off: Santa Sahi, Cuttack 753001. Branch: c/o Jaiswal Traders & Chemicals, 39-A Armenian St, Calcutta 700001; Ph: 391574; Business Controller: K N Jaiswal. Brand Names: Ayurved, Nutrimin.

BALLOUN PHARMACEUTICALS, 'Bharat Illam', R R C 9, Thirunagar, Madurai 625006, Tamil Nadu; Ph: 8114; Prop: Dr D V Subaschandran.

BHANDARI HOMOEOPATHIC LABORATORIES, DLF Industrial Estate No 1, Mile 14, Delhi-Mathura Rd, PO Amar Nagar, Faridabad 121003, Haryana; Ph: 273958 (Delhi), Gram: Homoeopathy, Delhi; R M Bhandari.

BHARATIYA AGRO-INDUSTRIES FOUNDATION, THE, (BAIF), Animal Health Div, Off Pune-Nagar Rd, Wagholi, Pune 412207; Ph: 70408-9, Gram: Baifon, Tlx: 0145-283; Chief Exec: Dr D S Gorhe; Gen Mgr:

Dr N S Datt; Addl Gen Mgr: Dr B S Rajya. Marketing Div: Hundekari Garage Bldg, 408/1 Swargate, Pune 411037; Ph: 37776; Mgr-Mktg: Dr C R Marathe. Products: Adrenaline Inj, Atropine Sulphate Inj, Calcium Borogluconate Inj, Calcium Borogluconate Compound Inj, Dextrose Inj 5%, 10% and 20%, Dextrose Saline Inj, Normal Saline Inj, Stilboestrol Inj, Sulphadiazine & Sulphadimidine Inj. Brand Name: BAIF.

BHARTIYA BOOTEE BHAWAN (REGD), 21 Mangal Nagar, Saharanpur 247001, UP; Ph: 4392, 5433 (resi), Gram: Herminsa; Partners: S K Agarwala, A K Agarwala; Hon Adviser & Financial Controller: P C Agarwala. Branch: PB No 18, Goriatoli, Near Chirayatar Bridge, Patna 800001; Ph: 24865, Gram: Herminsa; Mgr: P K Agarwal. Product: Ayurvedic medicines.

BHARATIYA PHARMACEUTICALS, 8-A Central Market (Pushpa Mkt), Lajpat Nagar, New Delhi 110024; Ph: 623865; Chief Exec: Dr R K Bhartiya.

BLUE CROSS FARMA, 16-2-147/3 New Malakpet, Hyderabad 500036; Ph: 552788, Gram: Bluecross; Mg Partner: Dr A D K Pani, Ph: 551677 (resi); Commercial Dir: Dr C P Thomas. Branch: 5/13 Rifle Range Rd, Calcutta 700019. Brand Names: Bovinex, Bovinex Plus, Galisol-A, Galisol-E, Toconex.

BOOTS COMPANY (INDIA) LTD, THE, 17 R Kamani Marg, PB No 680, Bombay 400038; Ph: 266981/5, Gram: Drugboots, Tlx: 011-3842. Brand Names: Supermindif, Supermindif (salt-free).

CADILA VETERINARY, Maninagar, Ahmedabad 380008; Ph: 54106, Gram: Cadila, Tlx: 012-427 CDMC IN; Mg Dir: I A Modi, Ph (resi): 412525; Mktg Mgr: Dr Arun Atrey; Product Mgr: Dr T Raman Kutty. Products/Brand Names: Cal-D-Rubra, Campicilin, Dexona, Neuroxin-12, Oripriam, Oxalgin, Pesulin liquid & bolus, Wormin (Mebendazole bolus and powder), Cadistin Inj, Campidex, Campisol, Liverjet Inj, Mifecol, Paaracetol. Feed Supplements: Bovivita (Vit A & D3), Cadiplex-C (Vit B-Complex & Vit C), Cadisol, Vitatone (Vit A, B12, C, D3, E), Winstress (Vit A, B12, C, D3, E), Dicirol (Vit D3), Avivita (Vit A, B2, D3, K), Clob (Clopidol 50%).

CONCEPT PHARMACEUTICALS PRIVATE LIMITED, Animal Health Div, 167, C S T Rd, Kalina, Santacruz (East), Bombay 400098; Ph: 6129605, 6142045, 6148972, Gram: Rifa-cept, Tlx: 011-78258; Mktg Mgr: Dr S



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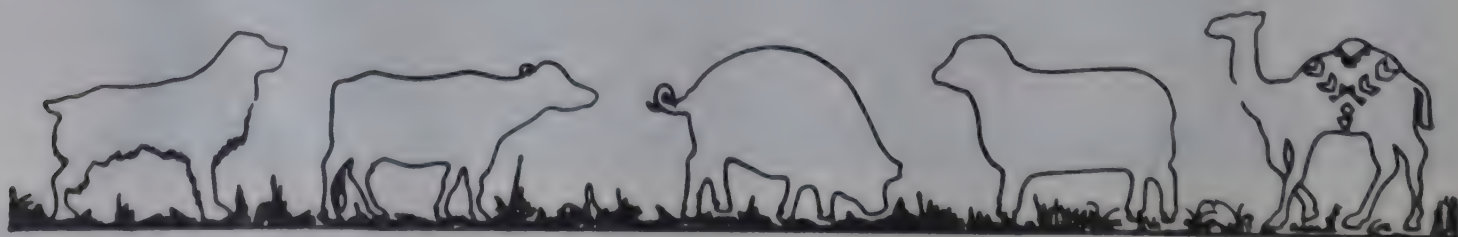
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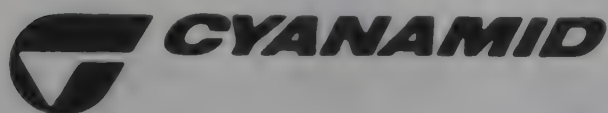
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Bhattacharyya. Products: Conampi Inj, Curadex Inj, Conciplex Inj, Ethcoxi, Vitacept Inj, Sulcoprim & Zodex Bolus & powder, Feed Supp: PlexaBC, Bovitol, Poulcon, Concimin.



CYANAMID INDIA LIMITED, Nyloc House, 254-D2 Dr A B Rd, Post Box No 9109, Bombay 400025; Ph: 4935211, Gram: Cyanamid, Tlx: 011-71162; Dir, Agril Products: C D Sipahimalani; Sales Mgr, Anim Products: Dr Asim Banerjee. Distribution Offices -- Bombay: "The International", 16 Marine Line Cross Rd No 1, Off Maharshi Karve Rd, PB No 11008, Churchgate, -400020; Ph: 291144, 291147, 291217, Gram: Leder-sales; Calcutta: Om Credit Corporation Bldg, P-32 Transport Depot Rd, -700088; Ph: 452731, 454013, Gram: Cyanamid, Tlx: 21-3361; Ghaziabad: Indra Udyog Bhavan, 58 Anand Indl Estate, Mohan Nagar, G T Rd, -201077; Ph: 866429; Hyderabad: C-14 Coop Indl Estate, PB No 8, Balanagar, -500037; Madras: 114 Suryanarayana Chetty St, Royapuram, -600013; Ph: 551755, Gram: Cyanagri; New Delhi: B-1/E Mohan Coop Indl Estate, Badarpur, -110044; Ph: 631197, 633744, 631293, Gram: Cyanamid; Patna: Patna Cold Storage Bldg, Shahaganj, -800006; Ph: 54727. Brand Names: Aureomycin Scour/Soluble Oblets; Aureomycin Oint for udder infusion; Aureomycin Soluble Powder; Aurofac 2A & 20; Verban solution.

D K PHARMA, 2/116 Mangaldas Bldg No 2, 5/9 Mangaldas Rd, Bombay 400002; Ph: 258995, Gram: Dhruvstar; Prop: Kirit C Dhruv, Ph (resi): 356546.

DOMESTO (PRIVATE) LTD, Gogineni Vari St, Maruthinagar, Vijayawada 520004; Ph: 63884; Mg Dir: M K Gupta, Ph: 74603 (resi); Sales Dir: B Hareswara Rao, Ph: 61528 (resi). Brand Name: Namlent, Pasutone, Tabestrus.

DYNAMIC PHARMACALS PVT LTD (Licencee of MSD AgVet, USA), Deonar, Sion-Trombay Rd, Bombay 400088; Ph: 5511832, 5515458, Tlx: 11-71224 CAPS IN; Dir: Vikram Tannan; Gen Mgr Mktg: A B Patwardhan, Ph (resi): 5121052. Brand Names: Amprol, Amprolium, Amprolsol, Amprolsol Plus, Ethopabate, Ivermectin, Ranide, Thiabendazole.

E MERCK (INDIA) LIMITED, Shivsagar Estate A, Dr A B Rd, Worli, PB No 16554, Bombay

400018; Ph: 4922855, Gram: Merckindia, Tlx: 11-73756; Mktg Mgr: Dr S R Khambata; Mgr (Pharma Div): J C D'lima. Product: Vitamins E Dry Powder 50%.

ESKAYEF LIMITED, Devanahalli Rd, Off Old Madras Rd, PB No 2, Bangalore 560049; Ph: 58861, Gram: Eskayef, Tlx: 845-411; Vice-Pres-Mktg, Anim Health Products: Dr C N Pandit; Sales Mgr, Anim Health Products: Vacant; Product Offr, Anim Health Products: Dr K V Mehta. Branches -- Bangalore: 49, First Block, Jayanagar, -560011; Ph: 602716; Vet Field Mgr: Dr C S Muralidharan; Chandigarh: 1092, Sector 21B, -160021; Ph: 32915; Vet Field Mgr: Dr R B S Walia; New Delhi: A-67 Dayanand Colony, Lajpat Nagar IV, -110024; Ph: 6444351; Vet Field Mgr: Dr O P Sanduja; Patna: B/137 People's Cooperative Colony, Lohianagar, Kankarbagh, -800020; Vet Field Mgr: Dr D K Goel; Pune: Nanda Deep, 1304 Shukrawarpeth, -411002; Ph: 444366; Vet Field Mgr: Dr V D Swadi; Vijayawada: 26-13-66 Sanyasi Raju St, Gandhi Nagar, -520003; Vet Field Mgr: Dr K Prasad. Brand Names: 'Furacin' Vet Ointment & Powder, 'Furea' Bolus, 'Helatac', 'Iodex' Vet, 'Neftin' Tablets, 'Nefuran'.

ESS KAY AGRO-VET INDUSTRIES, No 1230/C Katchery Rd, PB No 104, Vaniyambadi 635751, North Arcot Dist, Tamil Nadu; Ph: 2815, Gram: Micromin; Mg Partner: Syed Khader Basha. Branch: 14-9-74 Goolingspet, Chittoor. Product: Mineral Mixtures. Brand Name: Micromin.

FEEDS INDIA, 115B/3 Paramathi Rd, Ganesapuram PO, Namakkal 637002, Tamil Nadu; Ph: 2330, Gram: Feeds; Mg Partner: M K Ponnusamy, Ph (resi): 2130. Brand Names: Cyno 100, Feedomix, Feedon 200, 50, Minfeed, Minvit Forte.

G LOUCATOS & CO, Mercantile Chambers, 12 J N Heredia Marg, Ballard Estate, Bombay 400038; Ph: 263489, 269576, Gram: Gerasimos, Tlx: 011-73480 GLC IN, 011-73553 GLEN IN; Mg Partner: N K Shah, Ph (resi): 8224176; Mktg Mgr: R J P Bhatikar. Brand Names: Asuntol, Chlorovet, Gilpol.

GHARDA CHEMICALS PVT LTD, 48 Hill Rd, Bandra (West), Bombay 400050; Ph: 6422230, 6426852, 6422173, Gram: Ghardachem, Tlx: 011-71658; Mg Dir: Dr K H Gharda, Ph (resi): 6422730. Factory: B-29 MIDC, Indl Estate, Dombivli (East), Dist Thane 421203. Products: Quinapyramine sulphate, Quinapyramine prosalts. Brand Names: Quintrycide, Quintricide Prosalt.



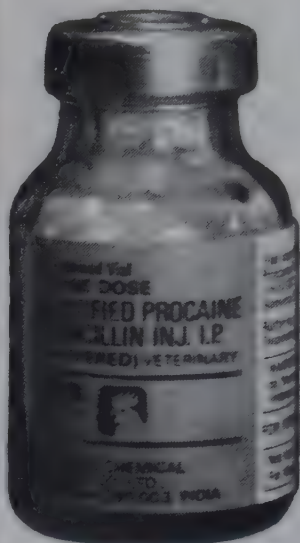
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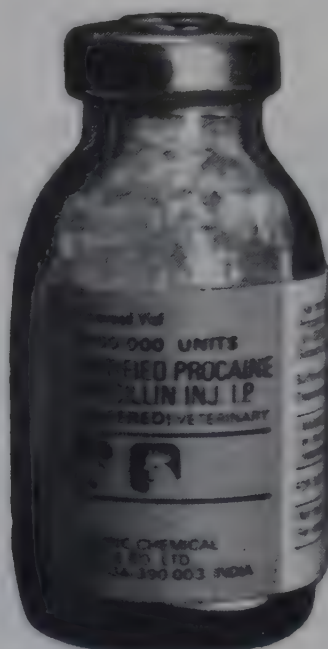
FORTIFIED PROCAINE PENICILLIN INJECTION VET.

procaine penicillin G fortified with
buffered crystalline
penicillin G sodium



LARGE DOSE VIAL

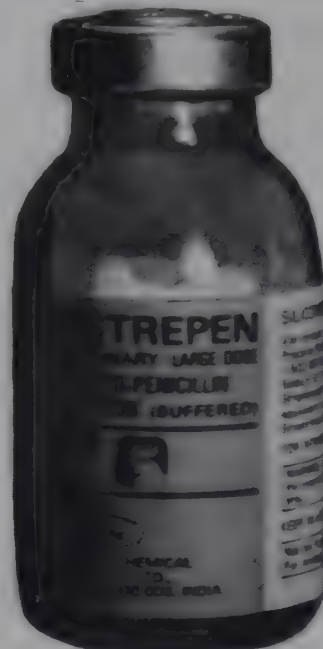
For the treatment of infections in all animals caused by Penicillin sensitive organisms such as Streptococci, Staphylococci, Clostridia, Corynebacteria, Bacillus anthracis, Actinomyces bovis, etc.



40 LAC UNITS VIAL

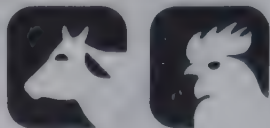
BISTREPEN INJECTION VET.

procaine penicillin G and
penicillin G sodium fortified
with streptomycin sulphate



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For the treatment of mixed infections in all animals caused by Gram-positive and Gram-negative organisms or where the causative organisms cannot be readily identified or where the bacteria are relatively more resistant to penicillin or streptomycin alone than to a combination of the two.



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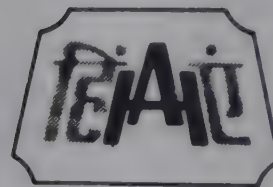
GLINDIA LIMITED (Formerly Glaxo Laboratories (India) Ltd), Agrivet Farm Care Div, Dr Annie Besant Rd, Worli, Bombay 400025; Ph: 4933871, 4933514, Gram: Glindtels, Tlx: 74410/71279 GLND IN; Mktg Mgr: V M Palkar; Mktg Dev Mgr: Dr A K Nijhawan; Tech Services & Training Mgr: Dr S C Arora; Zonal Mgrs: G P Lahiri (North-East), Dr K K Narasimhan (South-West). Branches — Bombay: Dr Annie Besant Rd, Worli, -400025; Ph: 4933871, Gram: Glindtels, Tlx: 74410/71279 GLND IN; Calcutta: 50 Hide Rd, -700088; Ph: 459195, Tlx: 7449 GLND IN; Madras: 30 Velachery Rd, Guindy, -600032; Ph: 414146, Tlx: 41487 GLND IN; New Delhi: Mathura Rd, Okhla, -110065; Ph: 6832269, Tlx: 65327/2473 GLND IN. Products/Brand Names: Injectables: Calvib, Livogen, Munomycin Forte, Prepalin Forte, Vibelan; Orals: Albomar, Brotone, B-Complex liquid, Fucox, Gastina, Kalzol B12 tonic, Piperzine; Feed Supplements: Binit, Groviron, Hyblend AB2D3K, Vimeral, Vitablend AD3, Vitablend WM Forte.

GOKA COMPANY, 4419 Malwiya Chowk, Panchavati, Nashik 422003; Ph: 74149; Prop: Kashinath Toshniwal; Mfg Chemists: Sushil Toshniwal, Sunil Toshniwal. Products: Vet Ayurvedic Medicines. Brand Names: Scabnil Oleo, Swellnil Ointment, Goka Khand Malam.

HERBS (INDIA) PVT LTD, PB No 160, Shardanagar, Saharanpur 247001, UP; Ph: 6044; Mg Dir: Sushiel Kumar Agrawal; Dirs: V K Agrawal, Kartikey Agrawal.

HILL GREEN LABORATORIES PVT LTD, 205 Padma, 164-A, S V Rd, Ville Parle (West), Bombay 400056; Ph: 577723; Mg Dir: Bipinchandra V Arya; Dirs: Devendra B Arya, Mrs Hansa B Arya. Products: Dermatic Ointment, Lactone Tablets Bolus, Livoklin Tablets Bolus, Yogarin Tablets Bolus. Brand Name: Hillgreen.

HIND-NIHON PROTEINS PVT LTD, Civil Lines, PB 76, Moradabad 244001, UP; Ph: 25509, 26885, Tlx: 575-201 HNP IN; Mg Dir: Ashok Malhotra. Product: Dicalcium Phosphate.



HINDUSTAN ANTIBIOTICS LTD (A Govt of India Enterprise), Pimpri, Pune 411018; Ph: 86511-13, 86522-24, Gram: Antibiotic, Tlx: 145-279; Mg Dir I/c: A K Basu; Gen Mgr Mktg: V Ratnasabapathy; Asst Mktg Mgr: K S Shankaranarayana. Regional Sales Depots — Ahmedabad: 30 Patel Estate, Opp Bank of Maharashtra, Narol Naroda Highway, Isanpur, -382343; Gram: Antibiotic; Bangalore: 'Matruchhaya', 44/2 Dickenson Rd, -560042; Ph: 579572, Gram: Penicillin, Tlx: 0845-8035; Bombay: 340 Sir J J Rd, Byculla, -400008; Ph: 379231, 897435, 899103, Gram: Antibiotic, Tlx: 011-4777; Calcutta: P-5 Scheme LII, CIT Rd, Puddapukur, -700014; Ph: 292759, Gram: Penicillin, Tlx: 021-7155; Cochin: Uthara Bldg, XXXVI/784 A1, Karakkat Rd, Ernakulam, -682016; Ph: 36787, Gram: Penicillin, Tlx: 885-567; Hyderabad: 3-6-111/8 Liberty Rd, Himyatnagar, -500029; Gram: Penicillin; Indore: 1060 Khatiwala Tank, Manikbagh Rd, Adjacent Telephone Exchange, -452001; Jaipur: 33 Sangram Colony, Durga Sula; Lucknow: 173/33 Dr B N Verma Rd, Aminabad, -226018; Ph: 33903, Gram: Antibiotic, Tlx: 535-234; Madras: 3 Murray's Gate Rd, Alwarpet, -600018; Ph: 454152, 450607, Gram: Penicillin, Tlx: 046-6098; New Delhi: 12/1 Asaf Ali Rd, -110002; Ph: 273508, Gram: Penicillin, Tlx: 031-3870; Patna: P-257, Block B, Premchand Marg, Opp Stadium, Rajendranagar, -800016; Ph: 53542, Gram: Antibiotic; Pune: HAL Hospital Compound, HAL Colony, Pimpri, -411018. Products: Corridan 2.5 g; Dynacil Vet 250 (soluble powder); Dynacil Vet 1.0 g; Longacillin Vet 6 lacs, 12 lacs, 24 lacs, 48 lacs; Primicin Vet 10 ml and 30 ml; Procillin Vet 20 lacs, 40 lacs; Vetopen 0.5 g, 1.0 g, 2.5 g; Hamidin 5.0 g; Oxytra 0.5 g.

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HOECHST INDIA LIMITED (formerly Hoechst Pharmaceuticals Ltd), Hoechst House, 193 Backbay Reclamation, Nariman Point, PB No 11123, Bombay 400021; Ph: 230607, Gram: Hextfam, Tlx: 5299/2747; Mgr Vet: Dr S L Sharma. Branches -- Ahmedabad: Mission Rd, Bhadra, PB 2, -380001; Ph: 393135-66, 393227, Gram: Hextind, Tlx: 323; Mgr: A V Rao; Bombay: Khetan Bhavan, 198 Jamshedji Tata Rd, PB 11026, -400020; Ph: 222064-86, 232886, Gram: Hostapharm; Mgr: K G Subramanian; Calcutta: 6 Ganesh Chandra Ave, -700017; Ph: 275404/0516, Gram: Hextfam, Tlx: 5348; Mgr: M P Dutta; Delhi: Hoechst House, 3/1 Asaf Ali Rd, PB 7065, -110002; Ph: 265451-2, Gram: Hextind, Tlx: 3135; R Sengupta; Hyderabad: 3-5-822 Hyderguda Rd, -500029; Ph: 231342/95/70, Gram: Hextind, Tlx: 6614; B Ahmed; Lucknow: Skylark, C-43/28 Nawal Kishore Rd, Hazratganj, PB 221, -226001; Ph: 47538, 45056, Gram: Hextind, Tlx: 256; Mgr: S J Mirchandani; Madras: McDowell House, 3 Second Line Beach, -600001; Ph: 20167-9, Gram: Hextfam, Tlx: 474; Mgr: V K Parmanand; Patna: 4/2 Bodh Marg, PB 117, -800001; Ph: 234113, 31386, 31387, Gram: Hextind, Tlx: 265; S C Kulkarni. Depots -- Cuttack: Ice Factory Rd, Junespatna, -753003; Ph: 21577, Gram: Hextind, Tlx: 205; Mgr: V B Chandra; Guwahati: Danish Rd, Pan Bazar, PB 107, -781001; Ph: 24399, 32430, Gram: Hextind, Tlx: 281; A Barpujari; Indore: 23/3 New Palasia, -452001; Ph: 5751-52, Gram: Hextind, Tlx: 227; Mgr: J S Wagh; Jainpur: J-2-33 Mahavir Marg, PB 129, -302001; Ph: 62089, Gram: Hextind, Tlx: 230; Mgr: A K Sahney. Brand Names: Albercilin Inj, Avil, Berenil, Hoechst Foot-and-Mouth Disease (FMD) vaccine, Hostacortin H C S, Hostacycline WS, Novalgin, Panacur, Tonophosphan.

HYGEIA FIELDS & MINERALS PVT LTD, 7-A Sannadhi St, Thiruvannamipur, Madras 600041; Ph: 411319 PP; Mg Dir: Dr V Ramasamy, Ph (resi): 415099. Factory: 146 Muttukadu Rd, Madras 600041; Ph: 416527. Products: Mineral Mixture. Brand Name: Hygeia.

IEL LIMITED, Crop Protection & Pharmaceuticals Div, Post Bag No 5, Ennore PO, Madras 600057; Ph: 554830-8, Gram: Savlon, Tlx: 041-586 ENUR IN; Chief Exec: R Seshasayee; Commercial Mgr: S M Vohra; Pharmaceuticals Commercial Dept: K Ganesh. Regd Off: 34 Chowringhee Rd, Calcutta 700071. Brand Names: Cetavlon, Hibitane Concentrate 5%, Lorexane Veterinary Cream, Nilverm, Savlon Vet Concentrate.

INDIAN DRUGS & PHARMACEUTICALS LIMITED (A Govt of India Undertaking), Mktg Div, A-7, 8, 9, Samrat Bhawan, Ranjeet Nagar Community Centre, New Delhi 110008; Ph: 5719051, 5715186, 5715193, Gram: Eidi-piel, Tlx: 031-2574; Dir (Mktg): Vikramajit, Ph: 5713512; Gen Mgr (Sales): Dr S S Jolly; Mgr (Vet): J N Verma; Sr Mktg Exec (Vet): Dr S C Srivastava; Sales Exec (Vet): S K Wazir. Regl Sales Offices -- Ahmedabad: Vidyagauri Nilkanth Marg, Khanpur, -380001; Ph: 20244; Bangalore: 49 Kengal Hanumanthaiah Rd, PB No 2728, -560027; Ph: 229024; Bombay: Brown Eoveri House, 264 Dr A B Rd, Worli, -400025; Ph: 4228059, 4228052; Calcutta: 1 Acharya J C Bose Rd, -700020; Ph: 440912; Chandigarh: 41 Sector 26-C, Madhya Marg, -160026; Ph: 32197; Cochin: 'Sandhya', Flower Junction, Ernakulam, PB No 1308, -682011; Ph: 39891, 33450; Delhi: 8 Community Centre, East of Kaillash, -110065; Ph: 6431678, 6431675; Guwahati: Soni Ram Bora Rd, Upubari, PB No 14, -781007; Ph: 27319; Hyderabad: 41-419/23 Troop Bazar, -500001; Ph: 41872, 52405; Indore: 17 Dr R S Bhandari Marg, Race Course Rd, -452003; Ph: 34167; Jainpur: 7 Narayan Singh Rd, -302004; Ph: 74276, 66104; Karnal: Minara Rd, -132001; Ph: 3578; Lucknow: Tej Bahadur Sapru Marg, Hazratganj, -226001; Ph: 33943, 49959; Madras: IDPL House, 109 Anna Salai, -600020; Ph: 840445, 840205; Patna: S P Verma Rd, -800001; Ph: 22441, 21773. Brand Names: Broacil Mastitis, Cal Borogluconate Inj, Cemizon (Vet) Inj, Dimidine Solution, Otcim Nutritional Formula, Otcim Vet Inj, Otcim Bolus, Penicillin Streptomycin, Phenacetin powder, Pip Adipate powder and tablets, Procaine Penicillin, Quinapyanine Inj (Prophylactic), Sod Sulphadimidine Inj, Streptomycin, Sulphaguanidine, Tetracycline water soluble powder, Vitamin Premixes.

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REGD. OFFICE: MAYBAKER HOUSE, WORLI, BOMBAY 400 025.

Chambers, 228 Nariman Point, Bombay
400021; Ph: 2020364; Chief Exec: P H
Miran. Product: Dicalcium phosphate.

INDIAN HERBS

INDIAN HERBS, Shardanagar, PB No 5, Saharan-
pur 247001; Ph: 6044, 6497, 7919, Gram:
Indianherb; Mg Partner: Ravi Agrawal, Ph
(resi): 7231; Partner: Kartikey Agrawal.
Branch: No 164/3 Vasavi Temple Rd, V V
Puram, Bangalore 560004; Ph: 622673.
Brand Names: Galog, Himalayan Batisa,
Himax, Koflix, Livol, Neblon, Pestoban,
Prajana, Saxom, Stonil, Taenil, Teeburb,
Replanta (Indigenous Vet Drugs).

interCare Limited

INTERCARE LIMITED, 38 J L Nehru Rd, Himalaya
House, Calcutta 700071; Ph: 240681-4, Tlx:
7855; Dir: Satyaki Ray. Branch: Pragati
Bhawan, Mezzanine Floor, Jai Singh Rd,
New Delhi 110001; Ph: 323209, 320961,
320754, Tlx: 3632; Mgr, Vet Products:
Capt (Dr) G S Sahi. Products: (Manufac-
turer: Intervet International BV,
Holland): Chorulon, DHL-Vaccine, Folli-
gon, Nobi Vac R, Rumicare, Sumaach.

JAY KAY AGRO-VET INDUSTRIES, 158/5 Trunk Rd,
PB No 102, Vaniyambadi 635751, N A Dist,
Tamil Nadu; Gram: Jaykay. Branch: 14-13-
36/1 Ramnagar Colony, Chittoor, AP; Mgr:
S Nisar Ahmed. Products: Mineral Mixtures.
Brand Name: Boostomin.

JUDES PHARMACEUTICALS PVT LTD, 27, 28 Main
Rd, Namakkal 637001, Tamil Nadu; Ph: 2085,
2718, Gram: Judes; Mg Dir: V Thirumalai,
Ph: 2375 (resi). Products: Feed Supple-
ments.



KTS PHARMACEUTICALS PVT LTD, PO Box 7612,
Bombay 400064; Ph: 6320868; Mg Dir: Dr V
D Dakwale. Branch: 5 Khatipura, 2nd Floor,
Indore 452007; Ph: 35207, 35209; Dr G
Mishra. Products: Bloaton suspension,
Calcium borogluconate Inj, Dextrose Inj,

Diostat suspension, Dynacal liquid,
Dynasulf ointment, Gunalgin Inj, Iovet
ointment solution, J Beillin Inj, Levi-
plex Inj, Nison ointment & powder,
Nufrozone bolus, Oxyceline Inj, Pharma-
zole powder, Sulphadimidine bolus, T-
Misol powder.

KARNAVATI PHARMACEUTICALS PVT LTD, Anil
Bhavan, Saijpur Towers, Ahmedabad 382345;
Mg Dir: N T Vithalani. Products: Trace
minerals, vitamin products, Lugol's
iodine solution, Gram's iodine solution.

KEMWELL PVT LTD, Kemwell House, 11 Tumkur
Rd, Yeshwanthpur, Bangalore 560022; Ph:
31796, 31876, 368730, Gram: Kemwell,
Tlx: 845-8319.

KENT PHARMACEUTICALS, Master Chamber, 52
A & B Queen's Rd, 1st Metro Cinema Rd,
Bombay 400020; Ph: 316590, Gram: Com-
plamino; Sales Mgr: Mahendra Turakhia,
Ph (resi): 573115. Products/Brand Names:
Complamino, Furalteen-50, 200, Livomin
Mineral Mixture, Synfuraan, Vitaminex,
Vitabee, Vitasol.

KERALA CHEMICALS & PROTEINS LTD, "Krishna
Kripa", XXXV/385 A3 Durbar Hall Rd,
Ernakulam South, Cochin 682016; Ph:
33448, 37805, Gram: Kemigel; Mg Dir:
Xavier Sebastian, Ph: 35269; Commercial
Mgr: A Madhavan. Product: Dicalcium
phosphate.

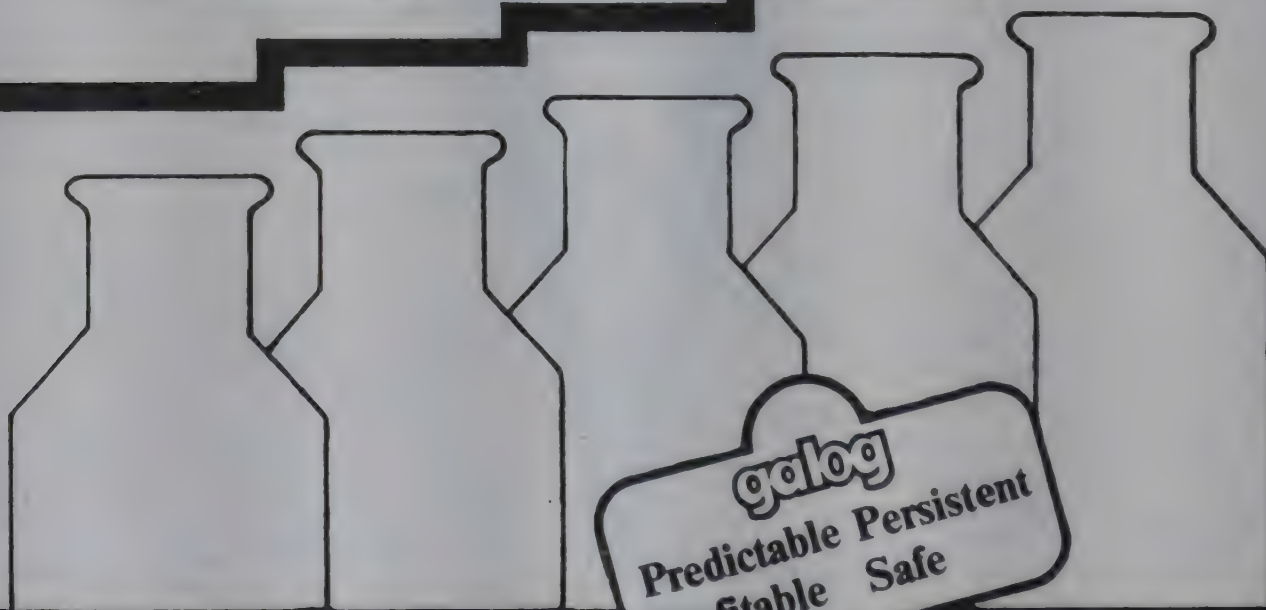
KWALITY AGRO-VET INDUSTRIES PVT LTD, PB No
29, Thane 400601, Maharashtra; Ph: 8390
(Vashi), Gram: Milkmore; Exec Dir: A M
Nadkarni. Products: Mineral Mixture,
Milkmore, Stable Licks.

M J PHARMACEUTICALS LIMITED, 113 Jolly Maker
Chambers No 2, Nariman Point, Bombay
400021; Ph: 2027311, 2020644, Gram: Emjay-
pharm, Tlx: 011-4677 MJAY IN; Mg Dir: J M
Shah; Divl Mgr: Dr C S Bedi; Product
Exec: Dr Satish Mudgal. Depots -- Amrit-
sar: 145 City Centre Scheme, Opp General
Bus Stand, -143001; Baroda: Shiya Baug,
Char Rasta, -390001; Bombay: 'Trimurti',
Plot No 505, Prakash Power Laundry Bldg,
Off Senapati Bapat Marg, Dadar, -400028;
Halol: Opp Anand Kendra, Halol Baroda
Highway, -389350. Brand Names: Ampijay
Inj, Ampijay soluble powder, Befovit,
Coxidot, Coyden-25, Elancoban-100, Furtin-
200, Furtin-500, M-Jaycal liq, M-Jayplex
liq, Suracide Inj, Tylan-50, Vitakare liq
(AD3EB12), Vitakare powders (AD3, AD3
Forte, AB2D3, AB2D3K).

MAY & BAKER (INDIA) LIMITED, Maybaker House,
Worli, PB No 9150, Bombay 400025; Ph:
4934511, 4934532, 4934914, Gram: Bismuth,

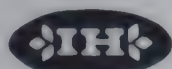


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Tlx: 011-71326 MBI IN; Mgr, Anim Health: B V Agnihotri; Mktg Mgr: P T Motwani.
Sales Offices -- Bangalore: 5/21 Akshaya Nilaya, Pampa Mahakavi Rd, Shankarapuram, PB 436, -560004; Ph: 606597, Gram: Bismuth, Tlx: 0845-8313 MBI IN; Bombay: Maybaker House, Worli, PB 9150, -400025; Ph: 4934511, 4934532, Gram: Bismuth, Tlx: 011-71326 MBI IN; Calcutta: 7 Old Court House St, PB 2023, -700001; Ph: 235535-37, Gram: Bismuth, Tlx: 021-2515 MBI IN; Guwahati: Sarat Chandra Goswami Rd, Pan Bazar, PB 104, -781001; Ph: 24095, Gram: Bismuth, Tlx: 0235-376 MBI IN; Hyderabad: 10-5-1/3A Masab Tank, -500028; Ph: 227204, Gram: Bismuth, Tlx: 0155-569 MBI IN; Indore: Bhan's Bungalow, 1/1 New Palasia, PB 175, -452001; Ph: 5934, Gram: Bismuth, Tlx: 0735-256 MBI IN; Jaipur: 31/32 Bani Park Extn Scheme, PB 223, -302006; Ph: 76419, Gram: Bismuth, Tlx: 0365-239 MBI IN; Lucknow: Akash Deep, 23 Vidhan Sabha Marg, PB 255, -226001; Ph: 47825, 43682, Gram: Bismuth, Tlx: 0535-305 MBI IN; Madras: 125 Marshalls Rd, Egmore, PB 773, -600008; Ph: 87430, 88053, Gram: Bismuth, Tlx: 041-7441 MBI IN; New Delhi: Chaudhury Bldg, K Block, Connaught Circus, PB 693, -110001; Ph: 350778, 351318, Gram: Bismuth, Tlx: 031-4504 MBI IN; Patna: 'Shanti-Niketan', Fraser Rd, PB 22, -800001; Ph: 21431, 22615, Gram: Bismuth, Tlx: 022-275 MBI IN. Brand Names: Acetylarsan, Anthiomaline, Antrima bolus, Calborol, Mifex, Phenergan, Tegeron, Thiophanate, Trodox, Vesadin, Vetoestrol.

MEDICINE INDIA PHARMACEUTICALS, 7-A Sannadhi St, Thiruvannamiyur, Madras 600041; Ph: 411319 PP; Prop: Dr V Ramasamy, Ph (resi): 415099. Product: Feed supplements. Brand Names: Mediamix Spl AB2D3, Mediamix AB2D3K, Mediaplex, Media Furan-50 and 200, Media Amine MA-100 B12, Mifuran, Media Minforte, Mediaplex-C (without B1), Medimin.

MEDINEX LABORATORIES PVT LTD, 26-27A Vithalwadi, Udyognagar, Bhavnagar 364001, Guj; Ph: 26306, 29102, Gram: Oxycide; Mg Dir: N N Thakkar, Ph (Bombay resi): 6364908; Dir: K N Thakkar. Branch: 1 Prabhat Nagar, Jogeshwari (West), Bombay 400102; Ph: 573572, 627471, Gram: Oxycide. Brand Names: Crystafol V Inj, Stardren V Inj.



MERIND LIMITED, New India Centre, 17 Cooperage Rd, Bombay 400039; GPO Box No 10081, Bombay 400001; Ph: 2020676, Gram: Merindby, Tlx: 011-3459. Animal Health Div (MERI-VET) & Chemicals & Export Div -- Gen Mgr: Dr J N Dwivedi; Mgr-Operations: Dr K K Agarwal; Mgr-Chemicals & Exports: S K Khanna; Mgr-Distribution & Coordination: Dr Y G Deshpande; Mgr-Sales: Dr Subash Kumthekar. Factory: Goregaon-Mulund Link Rd, Bhandup, Bombay 400078; Ph: 5618432, 5612584. Regional Managers -- Calcutta: Dr G Bhadra, 54/IC Shyampukur St, -700004; Hyderabad: Dr H D Ramachandrudu, Plot No 12, East Anand Bagh, Malkajgiri, -500047; Lucknow: A Pathak, c/o V C M Enterprises, 57 Ganga Prasad Rd, Maulviganj, -226018; New Delhi: Ravi Mathur, c/o R R Enterprises, 4808/24 Bharat Ram Rd, Daryaganj, -110002; Pune: R K Checker, Monica II Apartments, Flat No 11, 27/5 Dahanukar Colony, Kothrud, -411029. Products/Brand Names: Bolin (Paracetamol + Analgin), Cural (Chlorpheniramine), Dexavet (Dexamethasone), Levov (Levamisole), Pronil 'H' (Dimihazine acetate), Ridema (Frusemide), Telon LA (Oxytetracycline), Trypnil (Quinapyramine Salts), Vitamin B12.

MICRO LABS PRIVATE LIMITED, 303, Third Flr, 'A' Wing, Queen's Corner Apartments, 3 Queen's Rd, Bangalore 560001; Ph: 26785, 79609, Gram: Activite; Mg Dir: G C Surana, Ph (resi): 74898; Mktg Mgr: Dr M V R Reddy, Ph (resi): 567755. Branches -- Hosur: 92 SIPCOT Indl Complex, -635126, TN; Ph: 6618; Mgr: Anand Surana; Madras: 423 Kilpauk Garden Rd, -600010; Ph: 611789, 611712. Brand Names: Avicox, Bacitrim, Bancoxy-K powder, Clopidox, Furalay-200, Microsol, Mortin-Vet, Wormal.

MINIMIX PHARMACEUTICALS (P) LTD, 21-A Gandhinagar, PB No 5, Namakkal 637012, Tamil Nadu; Ph: 2390, 2948, Gram: Minimix; Mg Dir: Dr M R Nachimuthu, Ph: 2939, 2912 (resi). Branches: Bangalore, Madras.

MUHANA COMPANY, Muhana House, Shegaon (CR) 444203, Dist Buldana, Maharashtra; Ph: 36, Gram: Muhanaco; Mg Partner: Jugalkishore K Muhana. Brand Names: Jailick, Jaimin, Monolick, Vitalit AD3.

NANDYAL AGRO-VET INDUSTRIES PVT LTD, THE,



VERMITAN
 (Albendazole 15%)

VITATOR C LMB
 Each 500 g provides:
 Lysine 250 g
 Methionine 120 g
 Biotin 4 mg
 Vit B12 0.8 mcg

KETMIN 50 INJ.
 Each ml contains:
 Ketamine 50 mg
 Hydrochloride
 IM or IV

THEMINEURON INJ.
 Each ml contains:
 Thiamine 50 mg
 Pyridoxine 25 mg
 Vit B12 500 mcg
 IM or IV

Action	Albendazole depletes the glycogen store and destroys cytoplasmic micro-tubules of the worm cells	Lysine & Methionine, Biotin & B12 are all dietary essentials for the growth and production	By inhibiting Thalamus and Cortex a strong analgesia develops accompanied by superficial sleep which is near to the waking stage	B1 - Improves carbohydrate utilisation, B6 - enhances protein metabolism & B12 - helps in propionic acid metabolism in ruminants to get more energy
	Ideal to treat liver fluke, gastro intestinal and lung worms of domestic animals, which acts on both hypobiotic and adult stages	To improve growth and production (Milk) To treat dermatitis Alopecia Anoxia in dogs and other animals	Exam of restless animals, radiography, dislocation, ovarioectomy, castration, mandible surgery and control of zoo animals	To strengthen the nerves To be given after deworming or after antibiotic or chemotherapy to rejuvenate the rumino intestinal flora
Dosage	G I Tract worms Cattle 1G/20 kg body wt	Liver fluke 1G/15 kg body wt	IV 2 to 5 mg/kg (fasting for 24 hours before anaesthesia)	5-10 ml daily
	Sheep 1G/30 kg body wt	10G/day	(zoo animals) IM 7-8 mg/kg	3-5 ml daily
	Horse 1G/6 kg body wt. twice daily for 3 days	20G/day		5-10 ml daily
	Dogs 4G/6 kg body wt. twice daily for 5 days (For tape worms and hook worms) Single dose for round worms	10G/day	IM 10-20 mg/kg	2-3 ml daily
Contra Indications:	In cattle & Sheep Avoid within first 45 days of pregnancy Teratogenic properties for other species not known		Hyper tension, cardiac problems cerebral or hepatic dysfunction	
	15G 100G 500G	5kg	10 ml vial	10ml vial 30 ml vial

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TCL Animal Health"**

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 ARTEMIS Pharmaceuticals Pvt Ltd
 L-6224/7 GIDC Industrial Estate
 Ankleshwar Dist Bhavnagar
 Gujarat State



















Gangavaram Vill 518583, Kurnool Dist, Andhra Pradesh; Ph: 546 (Nandyal); Mg Dir: G Vijayaraghavan. Branch: Near Dilkush Nagar Bus Depot, Hyderabad; Ph: 64722; Mgr: K Gopal Chowdary. Brand Names: Calbomin, Maxomin, Nandimin.

NORTH STAR MARKETING PVT LTD, 407 Lakshmi Bhawan, 72 Nehru Place, New Delhi 110019; Ph: 6413130, 6430517, Gram: Norstar, Tlx: 31-3969; Mg Dir: Ravi Sikund, Ph (resi): 671334. Product: Dicalcium phosphate.

ORIENTAL TRADING SYNDICATE, 41/A Giriraj Indl Estate, Andheri (E), Bombay 400093; Ph: 6329296, Gram: Vetymed; Partner: Dinesh B Shah, Ph: 6364581 (resi). Brand Names: Acrilin, Blotovet, Fasciolax, Nizon, Obcodex, Obcow.

PASHUPAKSHI AUSHADHALAYA, 693 Budhwar Peth, Pune 411002; Ph: 446616, 448617; Mg Partner: V D Kelkar; Partner: Milind Kelkar. Products: Cocu plus, Teat plugs.

PASHU-PAKSHI PHARMACEUTICALS, 275 Shaniwar Peth, Pune 411030; Ph: 56931 (PP); Brand Names: Vitad Caps, Mineral Mixture.

PEARL CHEMICAL INDUSTRIES PVT LTD, 42 Strand Rd, Calcutta 700007; Ph: 335199, 335724; Mg Dir: S C Mullick; Dir: T K Burman. Factory: T N Mukherjee Rd, PO Raghunathpur 712247, Dist Hooghly. Brand Names: Arbine-V, Argicin-V, Bisterol, Calvin DS, Cestophene tabs, Minovit forte, Multisol bovine, Phenovet, Piperazine Adipate tabs, Sulphadimidine 33 $\frac{1}{3}$ %.

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PFIZER LIMITED, Express Towers, Nariman Pt, PB No 11602, Bombay 400021; Ph: 2022824, Gram: Pfizer, Tlx: 2115; Mktg Dir, Agril Div: Farrokh K R Mehta; Vet Services Mgr: Dr P P Jamkhedkar; Mktg Mgrs: Dr A C Arora, Dr M L Kanchan. Regional Offices—Bombay: Express Towers, Nariman Point, -400021; Ph: 2022824; Mgr: Dr S P Arora; New Delhi: Okhla Indl Estate, Phase-I, -110020; Ph: 635587, Tlx: 031-3126; Mgr: Dr K P Lathey; Secunderabad: 126 Sarojini Devi Rd, PB 1649; Ph: 72516, 72486, 74498; Mgr: Dr G S Bhushan Rao. Other Offices — Ahmedabad: Khanpur, PB 297;

Ph: 23067; Bangalore: 44/3-44/4 Dickenson Rd, GPO Box No 4204; Ph: 55865, 55510; Bombay: Quay St, Lakri Bunder, Darukhana; Ph: 8722424, 8726143; Calcutta: 36 Ganesh Chandra Avenue; Ph: 273373, 275556, 277997, Tlx: 7845; Cochin: XXX/466 Warrior Bldg, M G Rd, PB 1753; Ph: 32260; Cuttack: Dolmundi, GPO 65; Ph: 23224; Guwahati: Daar Ul Noor, Danish Rd, PB 47; Ph: 31925, 31976; Indore: 580 Mahatma Gandhi Marg, PB 116; Ph: 4875, 4166; Jaipur: 25 Bhagwandas Rd; Ph: 73789; Lucknow: Pilibhit House, 6 Shahnajaf Rd, PB 217; Ph: 48723, 46778; Ludhiana: 28 Club Rd; Ph: 23878; Madras: 2/24 Pantheon Rd, Egmore, PB 799; Ph: 843886, 843059, Tlx: 7313; Patna: Fraser Rd, PB 100; Ph: 23571, 21838; Srinagar: Dr Balwant Singh's Bldg, The Bund; Ph: 77045. Brand Names: Anorexon tablets, Banminth, Betacortril parenteral solution, Diadin tablets, Mastalone, Mastalone-U, Rumenton tablets, Terramycin AF tablets, Terramycin Egg formula, Terramycin injectable solution, Terramycin liquid, Terramycin ointment, Vermex liquid wormer, Feed supplements: Minimix, TM-10, TM-50, TN-forte, Vitamix-M.

PHARMACEUTICAL COMPANY OF INDIA (PCI), 305 Arun Chambers, Pt M M Malaviya Rd, Tardeo, Bombay 400034; Ph: 4947441/2, Gram: Pharmindia, Tlx: 011-75233 PCI IN; Mg Dir: K M Shah; Dir: M C Patel; Gen Mgr (Dev & Admn): Vijay Shah. Branches: Bangalore, Calcutta, Cuttack, Guwahati, Indore, Jabalpur, Jaipur, Lucknow, Madras, New Delhi, Patna, Secunderabad, Vapi. Products/Brand Names: Chemozine, Dipravet, Gentavet, Helmisol, Phenivet, Synthovet.

PIYA PHARMACEUTICAL WORKS, Mohan Nagar, Ghaziabad, UP; Ph: 866782, 866660. Delhi Off: Khurana Medicos, 23 Mangal Market, Bhagirath Palace, Chandni Chowk, Delhi 110006; Ph: 234696; Mg Ptnr: R P Khurana.



POLYOLEFINS INDUSTRIES LTD, Mafatlal Centre, 11th Floor, Nariman Pt, Bombay 400021; Ph: 2024226, Gram: Pilene, Tlx: 011-3478; Mgr, Chemicals Indent: L F Mascarenhas.

PRAKASH FEED MILLS PVT LTD, Plot No 3583,
Door No M-12, Anna Nagar East, Madras
600102; Ph: 615455, 617493, Tlx: 041-
8750 PFM IN; Mg Dir: Dr D V R Prakasha
Rao. Product: Mineral supplements. Brand
Name: Nutrimin Doctor's Special.

PROVIMI PRODUCTS PVT LTD, 3-F Mill Rd, Gobi-
chettipalayam 638476, Tamil Nadu; Ph:193,
293, Gram: Provimi. Regd Off: Bangalore.
Product: Mineral Mixtures.

PUNJAB AGRO-VET INDUSTRIES, 282 Industrial
Area, Phase II, Chandigarh 160002; Ph:
23204, 45662; Mg Partner: R K Bansal.
Product: Shakti Mineral Mixture.

PUNJAB BONE MILLS, 524 New Jawahar Nagar,
Jalandhar City 144001; Ph: 74058, Gram:
Gristing; Partner: Vir Khanna. Product:
Dicalcium phosphate.



RAKSHAK FARM AIDS PRIVATE LIMITED, Flat No
9, Kochar Apartments, Begumpet, Hydera-
bad 500016; Ph: 823081, Gram: Rakshak,

Tlx: 0155-6444; Mg Dir: A K Jairath, Ph
(resi): 822495. Products: Digestive
Enzymes, Electrolites, Minerals, Vitamins.
RALLIS INDIA LIMITED, Pharmaceutical &
Chemicals Div, Ralli House, 21 D S Marg,
PB No 166, Bombay 400001; Ph: 2048221,
Gram: Pharmralli, Tlx: 011-2357 RILB IN;
Divl Mgr, Animal Health: Dr N Satapathy;
Product Mgr: C Menezes. Zonal Offices —
Bangalore: 48 Sri Jayachamrajendra Rd,
-560002; Ph: 223904, Gram: Pharmralli,
Tlx: 043-202; Bombay: 21 D S Marg,
-400001; Ph: 2048221; Calcutta: 16 Hare St,
-700001; Ph: 234351/8, Gram: Pharmralli,
Tlx: 021-7201; New Delhi: United India
Life Bldg, F Block, Connaught Place,
-110001; Ph: 3310452, Gram: Pharmralli,
Tlx: 031-2201. Products/Brand Names: Cal-
B-Vet (Calcium Borogluconate Inj), Imferon
(Iron-Dextran Complex Inj), Livoderm Vet
(Liver Extract Oint), Vetycetine (Chloram-
phenicol Inj), Vetydine (Sulphadimidine
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RAYMON GLUES & CHEMICALS, 91-92 Atlanta, 209 Nariman Point, Bombay 400021; Ph: 235116, 235045, Gram: Wetfarm, Tlx: 011-3148; Partners: N B Patel, R B Patel, M B Patel. Product: Gelatine-Pharmaceutical, Capsule Grade, Dicalcium Phosphate. Brand Name: Raymon.

ROCHE PRODUCTS LIMITED, Vitamin Div, 28 Pt M M Malviya Rd (Tardeo Rd), PB No 7901, Bombay 400034; Ph: 4945890 (10 lines), Gram: Hofroche, Tlx: 75169, 76753; Gen Mgr: Dr V M Adhikari; Asst Mgr: Dr P P Vitkar. Distributors: Voltas Ltd. Brand Names: Rovibe, Rovimix, Rovisol oral.

ROUSSEL PHARMACEUTICALS (INDIA) LTD, Dr A B Rd, Worli, PB No 16568, Bombay 400018; Ph: 4921423, 4938531; Mktg Exec, Agrovat Div: Dinesh Bapat, Ph (resi): 6149533.

SABAR PHARMACEUTICALS, "Chaitanya-Kunj", Near Sonal Park Society, Himatnagar 383001; Ph: 1250; Prop: C N Shah. Product: Vet Medicines. Brand Name: Sabar.



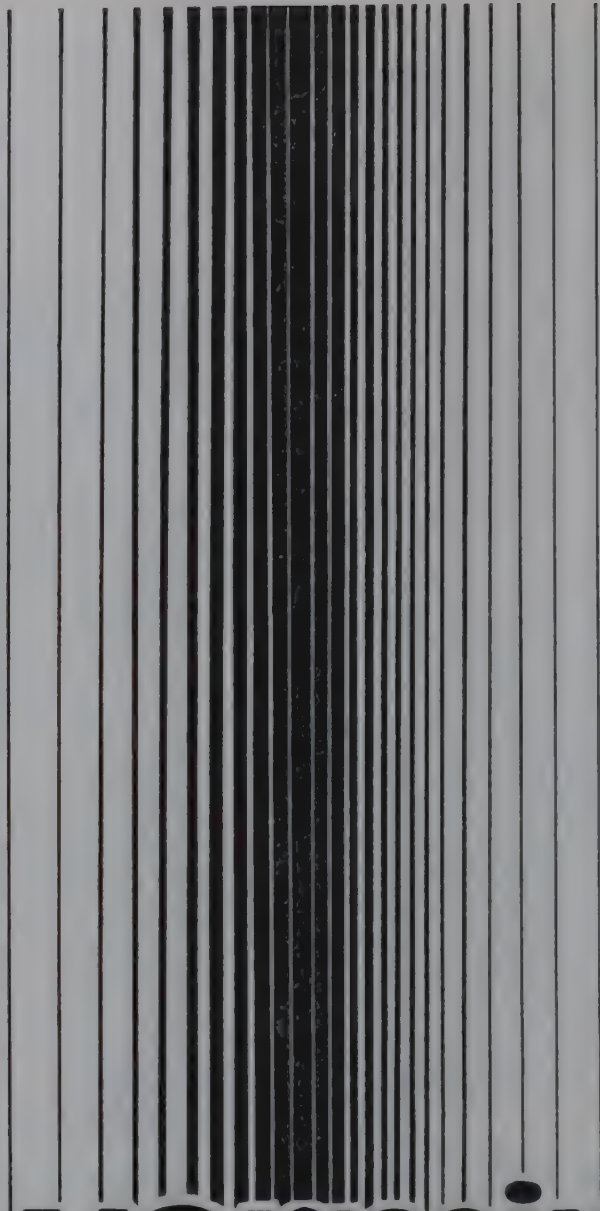
SARABHAI CHEMICALS, Mktg Head Off, Vet Div, Administration Bldg, 3rd Floor, Gorwa Rd, Baroda 390007; Ph: 320857, Gram: Farmvet, Tlx: 0175-551 SARA IN; Gen Mgr-Mktg, Vet Div: Dr S M Balan; Chief Mktg Mgr (Vet): Dr D N Tiwari; Mgr, Sales Coordination (Vet): Dr S Narayanan; Product Mgrs (Vet): Dr A P Mamtani, Dr J P Joshi, Dr D D Sharma. Plant & Laboratories: Wadi Wadi, PB No 31, Baroda 390007. Divisional Offices — Baroda: 616/617 Off Vikram Sarabhai Marg, PB No 3, -390003; Ph: 66873; Divl Mgr: Dr D R Shah; Calcutta: 27 Mirza Ghalib St, PB 9177, -700016; Ph: 240808-9; Divl Mgr: Dr A K Banerjee; Lucknow: 16 Vidhan Sabha Marg, PB 11, -226001; Ph: 47279; Divl Mgr: Dr B M Pant; Ludhiana: 337 Industrial Area 'A', PB 178, -141008; Ph: 23984; Divl Mgr: Dr B B Shonek; Madras: 3 Montieth Lane, Egmore, PB 790, -600008; Ph: 810881-2; Divl Mgr: Dr K S Varadarajan; New Delhi: Shyam Bhawan, 3rd Floor, 15/1 Asaf Ali Rd, -110002; Ph: 730747; Divl Mgr: Dr S B Sharma; Patna: Transport House, Janak-kishore Rd, Kadamkuan, -800003; Ph: 51741; Divl Mgr: Dr R N Chakravarty; Secunderabad: Plot 22/2/A & B, Bholakpur, PB 1679, -500003; Ph: 77315; Divl Mgr: Dr P Prabhakar Rao. Brand Names: Belamyl Inj, Bovirum Bolus, Calcium Borogluconate, Calcium Magnesium Borogluconate, Crys-4 Large Dose, Dicrysticin-LD, Oxyvet-LA, Vetade, Vetalog, Siquil, Esgipyrin-N, Curaminth, Curaminth-L, Doxyterin-DS Sol Powder, Maggocide Cream, Oxysteclin Inj, Pendistrin-SH, Piperazine Hexahydrate Liquid 61%, Piperazine Solution with Electrolytes, Steclin Bolus, Sulpha Bolus, Milkmin, Milkmin ISI w/o salt, Supplevite-M.

SAREEN HOMOEOPATHIC LABORATORIES, Court Rd, Near State Bank of India, Jagadhri 135003, Haryana; Ph: 6266; Prop: Dr Kumaril B Sareen. Brand Name: Sahovet.

SENTHIL CHEMICALS, 161 Velachery Rd, East Tambaram, Madras 600059; Ph: 48417, Gram: Velchem, Tlx: 041-6659 TITA IN; Prop: Dr R Thangappan. Products: Cattle Lick (Surabi), Stabilised Chlorine Sol & Tab (Sheele).

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- 1st Main, Vyalikaval, Bangalore 560003; Ph: 366225, Gram: Smakpharma; Mg Dir: B N Nanjundaiah.
- STAMAC PRODUCTS, 108 A & B Hazra Rd, Calcutta 700026; Ph: 474431, 470842.
- STANVET PRODUCTS PVT LTD, 13/1 Ultadanga Rd, Calcutta 700004; Mg Dir: Nirmal Bikash Chakraborty.
- SUPER ANIMAL HEALTH PRODUCTS, 95-B Gobind Nagar, Ambala Cantt 133001; Ph: 23585; Prop: Dr Gurdarshan S Walia. Brand Names: Fertyl-D3, Lactomin Forte, Superlick, Supertone, Tracemin.
- TTK PHARMA LIMITED, Animal Welfare Div, 66 Luz Church Rd, Madras 600004; Ph: 74110 (off), 433211 (factory); Mg Dir: Dr K Kuppaswamy; Gen Mgr (Mktg): S S Nadkarni; Sales Mgr: Dr D G Selvakumar; Dep Mktg Mgr: Bhaskar Balakrishnan. Regd Off: 6 Cathedral Rd, Madras 600086; Ph: 472040, Tlx: 041-7865 TTK IN. Products: Chloril Vet Inj, Epidosin Vet Inj, Ossopan Vet Granules, Ripason Inj, Robatran Vet Granules & Bolus, Robendol Vet Granules, Suspension & Bolus, Tefroli Vet Granules & Syrup, Valginate Vet Inj.
- THEMIS CHEMICALS LIMITED, Animal Health Div, Poonam Chambers, B Block, 3rd Floor, Dr A B Rd, Worli, Bombay 400018; Ph: 4929619, 4935958, Gram: Medithem, Tlx: 11-74492 TCL IN; Mg Dir: S D Patel; Mktg Mgr: Dr S S Chousalkar, Ph (resi): 620012. Products: Biogrand 10, Ketmin 50 Inj, Themineuron Inj, Vermitan, Vitator.
- TORRENT VETERINARY PRODUCTS PVT LTD, "Sanskrut", High Court Rd, Ahmedabad 380009; Ph: 445247, 460004, Gram: Trinilab, Tlx: 121-606.
- TRIDENT AGENCIES, 23/25 Dhirubhai Parikh Marg, Parekh Bldg, 3rd Floor, Princess St, Bombay 400002; Ph: 316424, 369927, Gram: Parlefeeds.
- TRIDENT PRODUCTS, 1-2-29 Gagan Mahal Rd, Hyderabad 500029; Ph: 62720; Mg Partner: R A Paul.



- UCAL BIO-TECH (A Div of the Union Co (Motors) Pvt Ltd), 118 Anna Salai, Madras 600002; Ph: 849232, Gram: Mossgreen, Tlx: 41-6094 UCAL IN; Gen Mgr: Gopal Madhavan. Brand Name: Ucal feed additive.
- UNICHEM LABORATORIES LIMITED, Agvet Div, Unichem Bhavan, S V Rd, Jogeshwari,

- Bombay 400102; Ph: 579680, 579686/87/88/89, Gram: Treatment, Bombay 400023, Tlx: 011-71185 UNI IN; Mg Dir: Dr P A Mody, Ph off: 4926614-15, 4923267, resi: 369643; Mktg Mgr (Vet Div): Dr A S Sheikh. Branches — Ghaziabad: C-32 Indl Area, Meerut Rd, PB No 22, -201003; Ph: 841496, 843271, Tlx: 0592-233; Plant Mgr: B K Sharma; Roha: Plot No 99, MIDC Area, Dhataw, -402116, Dist Raigad; Ph: 260/1/2/3, Tlx: 0136-214; Plant Mgr: P P Bardeshkar. Products: Biocycline LA, Biosol Bolus, Lincocin Forte, Lincospectin SS, Lutalyse, Neomix.
- UNIVERSAL PHARMACEUTICALS, K-73/4 GIDC Indl Estate, Mehsana 384002; Ph: 2922, 2068, 3118, Gram: Unipharma; Mg Partner: S K Rayaka.
- VENVET CHEMICALS PRIVATE LIMITED, 3-6-97 Shaheedyar Jung Rd, Near Thirumala Apts, Basheerbagh, Hyderabad 500029; Ph: 32616, Gram: Venvet; Mg Dir: Dr V Muniratnam; Tech Dir: Dr B Krishna Mohan Rao.
- VESPER INDIA, M S K S Bldgs, Surur Park Rd, Seshadripuram, Bangalore 560020; Ph: 369512, 364707, Gram: Vesper; Mg Partners: P N Sharma, Dr Suresh Sharma; Gen Mgr: H K Nanjaiah; Mktg Mgr: Vacant (New Delhi); Area Mgr: Vijay Narasimha Raju (Hyderabad); Sales Execs: Alikhan (Pune), E S Manoraj (Bangalore), Dwarkanath (Hyderabad), T Veera Raju (Hyderabad). Brand Names: AFS, Altoxol, Growfast, Kox-Care, Neo-Calcium, Protosol, Toxol.
- VETCARE, Div of Tetragon Chemie Pvt Ltd, No 90, 3rd Cross, 2nd Main, Gangenahalli, Bangalore 560032; Ph: 369174; Mg Dir: Bharat Tandon; Jt Mg Dir: C Gopalaswamy. Brand Names: Biocare, E Care Se, Electrocure, Neocare, Tineacare, Vitacare.
- VET REMEDIES, 8 Narayan Bhuvan, Off L B S Marg, Ghatkopar West, Bombay 400086; Ph: 584600; Prop: Mrs Anjana P Arya; Gen Mgr: Pradip Arya. Products: Dermovet Oint, Lactoup & Livocin tablets/powder; Mastivet tablets/powder, Yogavet tablets/powder.
- VIVIN CHEMICAL INDUSTRIES, PO Devsar Gandevi Rd, Bilimora 396321; Ph: 2290 (PP); Prop: S M Parikh, Ph (resi): 2863. Products: Mineral Mixtures.
- VYNA ORGANIC CHEMICAL INDUSTRIES LTD, SM House, 11 Sahakar Rd, Vile Parle (E), Bombay 400057; Ph: 6345094, 6341659, Tlx: 011-5631 SETY IN; Dir: B Vivek Shetty.
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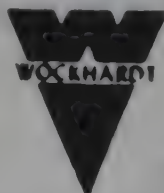
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WOCKHARDT VETERINARY PRIVATE LIMITED, Poonam Chambers, Shivsagar Estate, Dr A B Rd, Bombay 400018; Ph: 4938530, 4938557, Gram: Wochem, Tlx: 011-73837 WOCK IN; Mg Dir: H F Khorakiwala; Mktg Mgr: N S Mathur; Product Mgr: Dr H S Modak. Factory: Plot L1, MIDC Indl Estate, Jalgaon Rd, Chikalthana, Aurangabad 431001; Ph: 8496/7/8. Zonal Sales Offices — North Zone: BFF 2, Dilkush Indl Estate, G T Karnal Rd, Delhi 110033; Ph: 7120734; Zonal Sales Mgr: H B Das; South Zone: Wockhardt House, 6 Peters Rd, Royapettah, Madras 600014; Ph: 847396; Zonal Sales Mgr: C Sudhakar. Depots — Lucknow: 35 Havelock Rd, -226001; Ph: 32572, 33003; Thane: Godown 'J', Surendra Indl Compound, PB No 117, 2nd Pokhran Rd, Majiwada, -400601; Ph: 595106. Products/Brand Names: Ampicillin Inj (Vetampin); Oxytetracycline Inj & Tab (Wolicyclin); Oxytetracycline Double Strength Inj (Wolicyclin-DS); Sulphadiazine + Trime-thoprim Tabs & Powder (Woktrin); Vitamin B-complex & Choline Chloride with Crude Liver Extract Inj (Beekom-L); Inj of Calcium, Vit D3 & Vit B12 (Caldee-12); Calcium Borogluconate Inj of Calcium, Magnesium, Phosphorous with Vit B1 (Thiocal); Inj of 20% Dextrose with Balanced Electrolytes (Rintose); Ampicillin + Cloxacillin Intramammary Infusion (Tilox); Albendazole Suspension & Tablets (Analgon); Silica in dimethicone emulsion-antibloat (Bloatosil); Povidone Iodine 5% w/v soln (Betadine), Quinapryamine Prosalt (3:2) Inj (Triquin); Vit B-complex, Electrolyte and Dextrose Antistress Formula Powder (Strexia); Clopidol 25% Premix-coccidiostat (Cocci-lum); Furazolidone Feed Additive (Nefrazone-200).

Late Additions

ASIA GLUES & CHEMICALS PVT LTD, 774 Anna Nagar, Madurai 625020; Ph: 44099, 44355, Gram: Asiaglues. Product: Dicalcium phosphate.

CHEMET, Taj Bldg, 1st Floor, 210 Dr D N Rd, Fort, PB No 195, Bombay 400001; Ph: 263803-07, Gram: Deguchem, Tlx: 011-3229 DGKM IN. Branches: Calcutta, Delhi, Madras.

CUREWEL (INDIA) LIMITED, 608 Vishal Bhawan, 95 Nehru Place, New Delhi 110019; Ph: 6417986, 6449380, Gram: Gammacure, Tlx: 031-5303 CURE IN; Jt Mg Dir: Ashok Rajgarhia; Zonal Mgr (Vet): Dr R C Sikka. Products: Tylovet, Gentacure (Vet), Sulphadimidine Bolus, Sulphadimidine Inj, Curechlor (Vet) powder. Brand Name: Curewel.

JAGAT CHEMICALS PVT LTD, Express Towers, 17th Floor, Nariman Point, PB No 1421, Bombay 400021; Ph: 2020443, Gram: Jagat-chem, Tlx: 011-4732/5469; Dir: K Thiem; Mktg Mgr: N K Raman. Branches — Calcutta: Express Towers, 7th Floor, 42-A Shakes-pears Sarani, -700017; Ph: 446653; Mgr: A Malhan; Madras: 749 Anna Salai, -600002; Ph: 88564; Mgr: S Ganapathy; New Delhi: 56 Janpath, -110001; Ph: 321775; Mgr: T V Krishnan. Brand Names: Asuntol 50% WP, Asuntol 16% EC, Naganol.

MINIMIX PHARMACEUTICALS (P) LTD, 21-A Gandhinagar, PB No 5, Namakkal 637002, Tamil Nadu; Ph: 2390, 2948, Gram: Mini-mix; Mg Dir: Dr M R Nachimuthu, Ph: 2939, 2912 (resi). Branches: Bangalore, Madras.

PETCARE, No 90, III Cross, IIInd Main Rd, Gangenhalli Layout, Bangalore 560032; Ph: 369174, Gram: Vetcare, Tlx: 845-8047; Mg Dir: Bharat Tandon; Jt Mg Dir: C Gopalaswamy. Branch — Delhi: B-43, Phase II, Noida, Dist Ghaziabad; Mgr: O P Singh. Products: L-Mezole (Leva-misole), Solbac (Cotrimoxazole).

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ANAND MEDICAL STORE, S C F 16, Sector 19-C, Chandigarh 160019; Ph: 25860.

COMBINED MEDICAL STORE, S C F 9-10, Sector 19-C, Chandigarh 160019; Ph: 20208; Mg Partner: R L Bahl.

DELHI

AGVET CHEMICALS, 301 Meghdoot, 94 Nehru Place, New Delhi 110019; Ph: 6413370, 6431843; Chief Exec: Kamal Oswal.

BAXI MEDICAL STORES, Tis Hazari, Delhi 110054; Ph: 2511159, 2918681, Gram: Baxicos; Prop: Shashi Bakshi, Ph (resi): 587171, 5721616.

CHAWLA & CO, H-9 Vijay Chowk, Krishan Nagar, Delhi 110051; Ph: 212463; Vet Surgeon: Dr P C Chawla. Branch: Chawla Medical Store, 1694/9 Jogdhyan Gali, Bhagirath Place, Chandni Chowk, Delhi 110006; Ph: 2919622.

FAQIR CHAND SHANTI LAL, WZ-19 Uggar Sain Market, Ashok Nagar, New Delhi 110018; Ph: 502231, 533499 (resi); Partner: F C Vij, S L Vij.

GUPTA CLINIC, Rohtak Rd, Nangloi, Delhi 110041; Ph: 807260.

KAILASH CHEMISTS, Basrurkar Market, Moti Bagh, Part I, New Delhi 110021.

KAMAL MEDICAL STORES, Near Bus Stop, Najafgarh, Delhi 110043; Ph: 806338 -- Verma.

KAUSHIK MEDICOS, Khichripur Resettlement Colony, Delhi 110091.

MEDICINE CHAMBER, 1726/C Bhagirath Place, Delhi 110006; Ph: 234131, 235980.

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MANOHAR MEDICAL STORE, 'A' Market, Sector 6, Bhilainagar.

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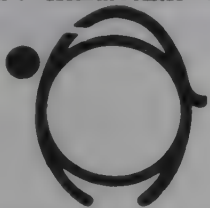
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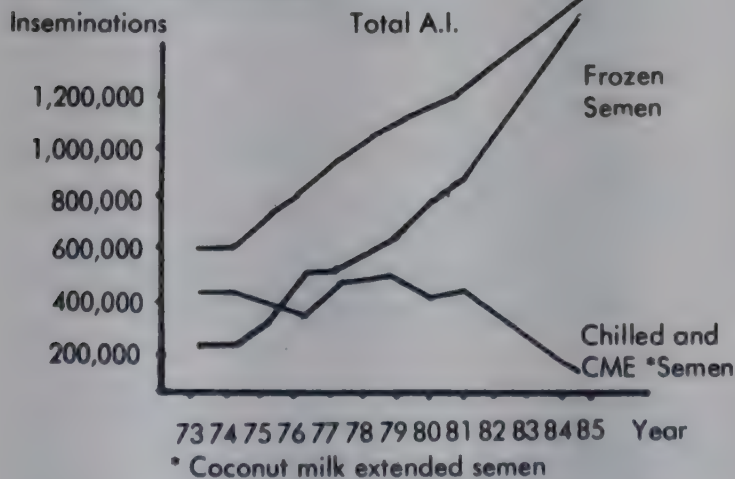
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KAIRA DISTRICT COOPERATIVE MILK PRODUCERS' UNION LTD, Amul Dairy Rd, Anand 388001; Ph: 3402 (10 lines), Gram: Amuldairy, Tlx: 0172-208; Mg Dir: V H Shah; Gen Mgr (Comml): J M Shah. (FSBS)



SABARMATI ASHRAM GAUSHALA (Managed by National Dairy Development Board), Bidaj Farm, PO Lali 387120, Tal Mehmedabad, Dist Kaira; Ph: Bareja 80 & 14; Offr Incharge: Dr N B Patel; Mgr (Sperm Station): Dr A K Kotecha. Services Offered: Bulls, frozen semen and liquid nitrogen. (FSBS)

HARYANA

CENTRAL INSTITUTE FOR RESEARCH ON BUFFALOES, Sirsa Rd, Hisar 125001; Ph: 4510, Gram: Bubalinex, Tlx: 0345-204 CIRB IN; Dir: Dr V D Mudgal, Ph off: 4513, resi: 4488; Farm Supdt: Dr Rohtas Singh, Ph: 4170; Scientist: Dr S S Sengar, Ph: 5147.

GOVERNMENT OF HARYANA, Directorate of Animal Husbandry, SCO No 80-81, Sector 17-C, Madhya Marg, Chandigarh 160017; Ph: 28334; Frozen Semen Bank — c/o Intensive Cattle Development Project, Gurgaon 122001; Ph: 22115; Offr Incharge: Dr K L Kumar. (FSBS)

HARYANA DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD, SCO No 127-128, Sector 17-C, Chandigarh 160017; Ph: 40259, 26624, 21124. Frozen Semen Production Station: Milk Plant, Gohana Rd, Rohtak 124801; Ph: 2832; Mgr: Dr K L Arora. (FSBS)

INDO-AUSTRALIAN CATTLE BREEDING PROJECT, Hisar 125001; Ph: 2836; Proj Dir: Dr M L Bhutani. (FSBS)

NATIONAL DAIRY RESEARCH INSTITUTE, Karnal 132001; Ph: 4293, Gram: Dairysearch, Tlx: 0396-204 NDRI IN; Dir: Dr R Nagarcenkar; Offr Incharge: Dr V S Raina. (FSBS)

HIMACHAL PRADESH

GOVERNMENT OF HIMACHAL PRADESH, Directorate of Animal Husbandry, Khallini, Shimla 171002; Ph: 3089; Offr Incharge (Semen Technology): Dr Dashrath Raj, Ph: 5199. Frozen Semen Bank: Bhangrotu, Mandi Dist. (FSBS)

JAMMU & KASHMIR

GOVERNMENT OF JAMMU & KASHMIR, Animal Husbandry Dept — Frozen Semen Banks — Jammu: Belicharana, -180003; Mgr: Dr R L Handoo; Srinagar: Ranbirbagh, PO Tullamulla, Ganderbal 191131; Mgr: Dr G A Ganaio. (FSBS)

KARNATAKA

CENTRAL FROZEN SEMEN PRODUCTION & TRAINING INSTITUTE, Government of India, Hesserghatta 560088, Bangalore North; Ph: 384272 (Bangalore Ex), 27 (Hesserghatta Ex), 45 (Lab, Hesserghatta); Dir: Dr P A Sarma, Ph (resi): 53; Asst Research Offr: Dr V K Arora. Production: 6,28,000 frozen semen doses. (FSBS)

GOVERNMENT OF KARNATAKA, Dept of Animal Husbandry & Vet Services, Visvesvaraya Centre Mini Tower, Dr B R Ambedkar Veedhi, Bangalore 560001; Ph: 27431. Centralised Semen Collection Centres — Bangalore (FSBS): Hebbal, -560024; Ph: 360839; Incharge: Dr G Basavaraju, Asst Dir; Belgaum: Ph: 25562; Incharge: Dr A G Hiremath, Asst Dir; Dharwad: Ph: 80009; Incharge: Dr M S Dixit, Asst Dir; Mysore: Ph: 23451; Incharge: Dr A K Nazeem, Asst Dir.

KANARA MILK PRODUCERS' COOPERATIVE UNION LTD, Syndicate House, Manipal 576119; Vet Offr: Dr Mallikarjun N Dixith. (FSB)

KARNATAKA COOPERATIVE MILK PRODUCERS FEDERATION LIMITED, No 22, Poornima Bldgs, J C Rd, 1st Cross, Bangalore 560027; Ph: 222691, Gram: Nandini, Tlx: 0845-574. Bull Breeding Farm & Frozen Semen Bank, Kakolu Post, Hesserghatta, Bangalore 560089; Ph: 59 (Hesserghatta Ex); Mgr: Dr Sampangi Reddy.

FED-DANE PROJECT, Government of Karnataka, Hessarghatta, Bangalore 560088; Ph: 384397; Offr Incharge: Dr H T Venkatesetty, Addl Dir. (FSBS)

KERALA

KERALA LIVESTOCK DEVELOPMENT AND MILK MARKETING BOARD LIMITED, Progeny Testing Scheme, Cattle Breeding and Progeny Testing Coordination Centre, Moovattupuzha 686669; Ph: 2763, Gram: Pasupal; Offr Incharge: Dr C T Chacko. Bull Stations — Dhoni: Dist Palghat; Ph: 8127; Kulathupuzha: Dist Pathanamthitta; Ph: 47, Gram: Milma, Kpzh; Madupetti: Near Munnar; Ph: 389, Gram: Indoswiss, Mpty. (FSBS). Regional Semen Banks — Cannanore, Chalakudy, Kulathupuzha,

Mavelikara (Vazhuvadi, PO Thazhakkara, -690102; Ph: 692; Offr Incharge: Dr N R Unnithan), Moovattupuzha, Puthuppady.

MADHYA PRADESH

GOVERNMENT OF MADHYA PRADESH, Directorate of Vet Services, Tulsi Nagar, Bhopal 462005; Ph: 61152. Frozen Semen Bank: Jahangirabad, Bhopal 462008; Asst Dirs: Dr J P Gupta, Dr B B Shrivastava. Bull Mother Farms: Bhadbhada (Bhopal); Sar-kanda (Bilaspur).

MADHYA PRADESH DUGDHA MAHASANGH (SAHAKARI) MARYADIT, G T B Complex, Roshanpura, Bhopal 462003; Ph: 61365-6. (FSBS)

MAHARASHTRA

BAIF'S RESEARCH INSTITUTE FOR CATTLE & AGRICULTURE DEVELOPMENT, Uruli-Kanchan 412202, Dist Pune; Ph: 248, 265, 347, 348, Gram: Baifon, Tlx: 0145-283; Offr Incharge & Res Programme Organiser: Dr B R Mangurkar, Ph: 219; Specialist: Dr M R Bhosrekar. Coordinators -- Gujarat: Dr B R Patil; Karnataka: Dr R K Mahuli, Dr G R Hegde; Maharashtra: Dr B R Mangurkar; Rajasthan: Dr M S Sharma; Uttar Pradesh: Dr S B Gokhale. (FSBS)

DEVELOPMENT CORPORATION OF KONKAN LTD, Aarey Milk Colony, Goregaon (East), Bombay 400065; Chief Vet Offr: R N Samant. (FSBS)

GOVERNMENT OF MAHARASHTRA, Directorate of Animal Husbandry -- Frozen Semen Bank -- Nagpur (FSBS): Telakhedi; Asst Dir: Dr N N Netkar; Pune (FSBS): Kirkee, -411003; Dep Dir (Frozen Semen): Dr R S Kulkarni, Ph: 55271. Bull Mother Farms -- Cattle Breeding Farms: Bod, Dist Amravathi; Desaiganj, PO Wadsa, Dist Gadchiroli; Harsool, Aurangabad; Hetikundi, Dist Wardha; Hingoli, Dist Parbhani; Jath, Dist Sangli; Junoni, Dist Sholapur; Kopergaon, Dist Ahmednagar; Nagpur: Telakhedi; Pohara, Dist Amravathi; Pune: Tathawade; Udgir, Dist Latur; Yeotmal.

JALGAON JILHA SAHAKARI DUDH UTPADAK SANGH MAYRADIT, Near Erandol Naka, PB No 32, Jalgaon 425001; Ph: 4030. (FSBS)

MANIPUR

GOVERNMENT OF MANIPUR, Directorate of Veterinary & Animal Husbandry, Near Sanjen-thong, Imphal 795001; Ph: 20224. Frozen Semen Bull Station: Prompat, Dist Imphal.

MEGHALAYA

GOVERNMENT OF MEGHALAYA, Directorate of Animal Husbandry & Veterinary Dept, Addl Bldg, Civil Secretariat, Shillong 793001; Ph: 4201. (FSB)

NAGALAND

GOVERNMENT OF NAGALAND, Directorate of Veterinary & Animal Husbandry, Kohima 797001; Ph: 494. Frozen Semen Bull Station: Wokha; Dist Vet Offr: Dr P N Jamir.

ORISSA

GOVERNMENT OF ORISSA, Directorate of Animal Husbandry, Dairy & Veterinary Services, Mangalabag, PB No 44, Cuttack 753001; Ph: 21929. Frozen Semen Banks -- Bhawani-patna (Bolangir): Dep Dir: Dr S N Mohanty; Cuttack: Khapuria, -753010; Ph: 23022; Dep Dir: Dr L D Mohanty. (FSBS)

PONDICHERY

GOVERNMENT OF PONDICHERY, Directorate of Animal Husbandry, Pondicherry 605001; Ph: 7028; Dep Dir (FSBS): Dr Jacob Chacko, Ph: 6135.

PUNJAB

GOVERNMENT OF PUNJAB, Animal Husbandry Dept, 17 Bays Bldg, Sector 17, Chandigarh 160017; Ph: 24409. Frozen Semen Banks-cum-Bull Stations: Nabha, Patiala, Verka (Amritsar Dist) (FSBS); Regional Semen Banks: Bhatinda, Kotkapura, Nabha, Patiala, Sangrur, Verka.

PUNJAB STATE COOPERATIVE MILK PRODUCERS' FEDERATION LTD, SCO 3015-18, Sector 22-D, Chandigarh; Ph: 27224 -- (i) Semen Bank, G T Rd, PB No 8, Bhattian, Khanna 141401; Ph: 20752, farm: 20959; Offr Incharge: Dr Mohanth Singh; (ii) Sutlej Bed Bet Farm, Ropar; Ph: 264; Gen Mgr: Dr M S Bagga, Ph (resi): 231.

RAJASTHAN

RAJASTHAN COOPERATIVE DAIRY FEDERATION LTD -- Frozen Semen Bank & Exotic Nucleus Farm, Bassi 303301, Dist Jaipur; Ph: 42, Gram: Freezesemen; Mgr: G Bhambhani, Ph (resi): 54. (FSBS)

TAMIL NADU

BUFFALO FROZEN SEMEN STATION, Tamil Nadu Cooperative Milk Producers' Federation Ltd, Chithode, Erode; Proj Mgr: Dr G Ramamoorthy.

GOVERNMENT OF TAMIL NADU, Animal Husbandry Dept, Central Office Bldgs (Block II), Greams Rd PO, Madras 600006; Ph: 450170. Frozen Semen Banks — Thanjavur: Exchenkottai 614902; Ph: 503; Incharge, Dep Dir: Dr V Ganamurthy; Tirunelveli: Abishekapatti; Ph: 3657. (FSBS)

NUCLEUS JERSEY & STUD FARM, c/o Tamil Nadu Cooperative Milk Producers' Federation Ltd, Finger Post, Udhagamandalam 643006, Nilgiris Dist; Ph: 2695; Proj Mgr Incharge: Dr R Kothandapani. (FSBS)

TRIPURA

GOVERNMENT OF TRIPURA, Directorate of Animal Husbandry, H G Basak Rd, Astabal, Agartala 799001; Ph: 3528. Frozen Semen Bull Station: Nalkata.

UTTAR PRADESH

GOVERNMENT OF UTTAR PRADESH, Animal Husbandry Dept, Gokaran Nath Rd, Lucknow 226007; Ph: 74857. Frozen Semen Banks — Almora; Basti; Meerut; Lucknow: Chak Ganjaria, -226002; Proj Offr: Dr B S Bhandari. (FSBS)

HINDUSTAN LIVESTOCK SALES CORPORATION, 80 Hardwar Rd, PO IIP, Mohkampur, Dehra Dun 248005; Ph: 25853, Gram: Atma, Tlx:

0595-270; Pres: Dr A S Bindra. Branches: Bihar, Delhi, Haryana, J & K, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu. Foreign Principals: Animal Enterprises, New Zealand; Bovec, France; Bovidan, Denmark; Union Des Cooperatives, D'Elevage Alpes Et Rhone.

PRADESHIK COOPERATIVE DAIRY FEDERATION LTD, Infant Milk Food Factory, PO Dalpatpur, Moradabad Dist; Ph: 74006. (FSBS)

WEST BENGAL

GOVERNMENT OF WEST BENGAL, Directorate of Veterinary Services, 37 Belgachia Rd, Calcutta 700037; Ph: 528032; Supdt of Vet Services (AI): Dr S S Roy. Semen Collection Stations — Alipurduar, Balrampur, Baligori, Balurghat, Beldanga, Bethuadahari, Burdwan, Chinsurah, Cooch Behar, Duswrath, Gobordangak, Haringhata (Mohanpur), Jhargram, Kaliachak, Kaliganj, Kalimpong, Kurseong, Malda, Mathabhanga, Midnapore, Moynagiri, Narendrapur, Purulia, Ranjitpur, Samsi, Satgachi, Suri, Tamruk, Vishnupur.

HIMALAYAN COOPERATIVE MILK PRODUCERS' UNION LTD, Matigara 734428, Dist Darjeeling; Ph: 22512, 22681 (Siliguri Ex); Proj Offr (SF): Dr P Nandi. (FSBS/FSB)

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FROZEN SEMEN TECHNOLOGY

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The Director

CENTRAL FROZEN SEMEN PRODUCTION & TRAINING INSTITUTE

Ministry of Agriculture, Government of India

Hessarghatta 560088, Bangalore North

Phones: 384272 (direct from Bangalore)

27 & 45 Hessarghatta Exchange

Telex No: 845-5088 CPTI

SERUM INSTITUTE OF INDIA (P) LTD.

VETERINARY DIVISION

212/2, Hadapsar

PUNE 411028

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Veterinary Biologicals

institutions in the public and private sectors manufacturing vaccines and other biological products for use on cattle are listed below, statewide. Abbreviations: AP: Alum Precipitated; BQ: Black-Quarters; C-19: Cotton Strain-19; FD: Freeze Dried; FMD: Foot-and-Mouth Disease; GTV: Goat Tissue Viral; HS: Haemorrhagic Septicaemia; OA: Oil Adjuvant; RP: Rinderpest; and TCV: Tissue Cultural Viral.

ANDHRA PRADESH



INDIAN IMMUNOLOGICALS (A Unit of Indian Dairy Corporation, Managed by National Dairy Development Board), 11-4-657, Lakdikapul, Hyderabad 500004; Ph: 224523, 37522, Gram: Immune, Tlx: 0155-6501; Gen Mgr: N Viswanath, Ph: 31608; Mktg Mgr: Dr B R Saxena; Mgr (Quality Control): Dr V A Srinivasan; Dep Mgr (Production): A V R Raju. Laboratory: Survey No 26, Vill Gachibowli, Ranga Reddy Dist; Ph: 31608. Regional Mktg Offices/Depots (Vaccines are stocked and available) — Ahmedabad: Sabarmati Ashram Goshala, Ashram Rd, -380027; Ph: 407088; Bangalore: NDDB, Sabari Complex, 24 Residency Rd, -560025; Ph: 578951, 578952, Gram: Dairyboard, Tlx: 0845-594; Calcutta: NDDB, Block No DK, Sector II, 3rd Floor, Salt Lake City, -700091; Ph: 350426, Gram: Dairyboard, Tlx: 021-7219; Madras: IDC, Mount View, 646, Mount Rd, -600006; Ph: 81815, Gram: Opflood, Tlx: 041-7226; New Delhi: NDDB, PB No 4906, Safdarjung Enclave, -110029; Ph: 603586, 603964, Gram: Dairyboard, Tlx: 031-3768. Cell Offices — Bhopal: NDDB, HIG-12, Triveni Complex, Roshanpura, -462003; Ph: 65433; Bhubaneswar: c/o Orissa State Coop Milk Producers' Federation Ltd, D-2 Sahid Nagar, -751007; Ph: 54573, Gram: Omfed, Tlx: 0675-218; Chandigarh: c/o Punjab State Coop Milk Producers' Federation Ltd, SCO No 3015-16, Sector 22-D, -160022; Ph: 32987, Gram: Milkfed; Guwahati: c/o West Assam Milk Producers' Coop Union Ltd, UN Bezbaruah Rd, Silpukhuri,

-781003; Lucknow: c/o Lucknow Coop Milk Producers' Union Ltd, Jopling Road, -226001; Ph: 42102. Vaccine: FMD Vaccine — Quadrivalent vaccine incorporating the most prevalent strains O, C, Asia 1 and A22 isolated from recent FMD outbreaks in the country. Brand Name: Raksha. POULTRY VIRAL VACCINE PRODUCTION CENTRE (PVVPC), Samalkot 533440, Dist East Godavari; Dep Dir: Dr Rashid Khan; Asst Dirs: Dr V Venkateswara Rao, Dr K V Chowdari, Dr M Venkateswarlu. Vaccines: Rinderpest Tissue Culture. VETERINARY BIOLOGICAL AND RESEARCH INSTITUTE, Shantinagar, Hyderabad 500028; Ph: 36356, Gram: Biovet; Jt Dir: Dr Krishna Ashrit. Vaccines: Anthrax Spore, BQ, HS (AP & OA), RP (FD GTV & TCV).

ASSAM

INSTITUTE OF VETERINARY BIOLOGICALS, AH & Vet Dept, Khanapara, Guwahati 781022; Ph: 83111, Gram: Vaccine; Addl Dir: Dr D D Dass. Vaccines: Anthrax, BQ, HS, RP.

BIHAR

INSTITUTE OF ANIMAL HEALTH & PRODUCTION, PO Bihar Veterinary College, Patna 800014; Ph: 24343, Gram: Vetinst; Dir: Dr R S Sharma. Vaccines: Anthrax Spore, BQ, HS (AP), RP (FD GTV).

GUJARAT

ANIMAL VACCINE INSTITUTE, Near Water Tank, Sector 28, Gandhinagar 382028; Ph: 2464, Gram: Vetvaccine; Dep Dir: Dr Hirabhai R Patel; Virologist: Dr H M Parikh; Production Offr (Bacterial): Dr I C Goswami; Production Offr (Viral vaccine): Dr M B Simaria; Vet Offrs: Dr B N Dave, Dr Girishbhai P Vyas, Dr Rameshchandra A Hirani, Dr Ashok Kumar V Hathi, S M

Mistry. Vaccines: BQ, HS (AP), Sheep Pox.

HARYANA

HARYANA VETERINARY VACCINE INSTITUTE, Hisar 125004; Ph: 4093, Gram: Vaccine; Dep Dir: Dr Hari Singh Dahiya. Vaccines: BQ, HS (AP & QA), RP (FD GTV).

JAMMU & KASHMIR

BIOLOGICAL PRODUCTION CENTRE, R S Pura, Jammu 181102; Research Offr (Vaccines): Dr Narottam Singh. Vaccine: HS.

KARNATAKA

INSTITUTE OF ANIMAL HEALTH AND VETERINARY BIOLOGICALS, Hebbal, Bangalore 560024; Ph: 362443, 361502, Gram: Anihealth; Dir: Dr B S Keshava Murthy. Vaccines: Anthrax. BQ, HS, RP (TCV).

KERALA

INSTITUTE OF ANIMAL HEALTH AND VETERINARY BIOLOGICALS, Palode, PO Pacha 695562, Trivandrum Dist; Ph: 62 (Palode); Dir: Dr C K Ramachandran. Vaccines: Anthrax Spore Vaccine, BQ, HS (Broth & QA).

MADHYA PRADESH

INSTITUTE OF ANIMAL HEALTH & VETERINARY BIOLOGICALS, Rasalpara, Mhow 453446, Dist Indore; Ph: 367, Gram: Jaivik; Dir: Dr D S Shivdekar, Ph resi: 333. Vaccines: Anthrax, BQ, HS (AP & QA), RP, Rabies (Curative & Prophylactic).

MAHARASHTRA

BHARATIYA AGRO-INDUSTRIES FOUNDATION (BAIF), Research Institute of Animal Health, Off Pune-Nagar Rd, Wagholi, Pune 412207; Ph: 70408-9, Gram: Baifon, Tlx: 0145-283; Chief Exec: Dr D S Gorhe; Gen Mgr: Dr N S Datt. Mktg Div: Hundekari Garage Bldg, 408/1 Swargate, Near Laxminarayanan Theatre, Pune 411037; Mktg Mgr: Dr C R Marathe. Vaccines: BQ, Brucella Abortus C-19 (live), FMD (Concentrated, Quadrivalent), FMD (Concentrated, Monovalent), FMD (Superconcentrated Quadrivalent), HS, HS-BQ combined, RP (FD TCRP). Diagnostic Antigens: Abortus Bang Ring (ABR), Brucella Coloured, Brucella Plain, Brucella Rose Bengal, Mastitis Diagnostic Reagent, Tuberculin (Mammalian) Concentrated.

HOECHST INDIA LIMITED, Hoechst House, 193 Backbay Reclamation, Nariman Point, PB No 11133, Bombay 400021; Ph: 230607, Gram: Hextfam, Tlx: 2747; Mgr, Vet: Dr S L Sharma. Vaccine: FMD. Brand Name: Hoechst.

INSTITUTE OF VETERINARY BIOLOGICAL PRODUCTS, Ganeshkhind, Aundh, Pune 411007; Ph: 57962, 53789, Gram: Biolab; Jt Dir: Dr S M Kale. Vaccines: Anthrax, BQ, HS, TCRP. SERUM INSTITUTE OF INDIA (P) LTD, Vet Div, 212/2 Hadapsar, Pune 411028; Ph: 72069, 70949, 72016, Gram: Hindesealol, Tlx: 145-216 SEAL IN; Mg Dir: Cyrus S Poonawalla; Dir: Z S Poonawalla; Mktg Mgr: Dr Abhay M Desai. Vaccine: Anti-Rabies. Brand Name: Rabisin.

ORISSA

ORISSA BIOLOGICAL PRODUCTS INSTITUTE, Bhubaneswar 751003; Ph: 50243, Gram: Serologist; Offr Incharge: Dr P Dasgupta. Vaccines: BQ, HS (AP & QA).

PUNJAB

PUNJAB VETERINARY VACCINE INSTITUTE, PAU Campus, Ludhiana 141004; Gram: Vaccines; Dep Dir: Dr Tirath Singh. Vaccines: Anti-Rabi Post-Bite, BQ, HS, RP.

RAJASTHAN

REGIONAL VETERINARY BIOLOGICAL UNIT, New Colony, Jaipur 302001; Ph: 62171, Gram: Anivax; Jt Dir: Dr V R Ambwani. Vaccines: Anthrax, BQ, HS, RP.

TAMIL NADU

INSTITUTE OF VETERINARY PREVENTIVE MEDICINE, Ranipet 632402, North Arcot Dist; Ph: 233, Gram: Seruminst; Dir Incharge: Dr V M Sathyanarayanan. Vaccines & BPS: Anthrax Spore, BQ, Bovine Lymphangitis, Brucella C-19; Brucella diagnostic antigens; coloured antigen & milk ring test antigen etc; HS (QA) & (Serum precipitated), RP (FD GTV), RP TCV, Rabies (ICD).

UTTAR PRADESH

BIOLOGICAL PRODUCTS SECTION, AH Dept, Badshahbagh, Lucknow 226007; Ph: 75365, Gram: Vaccine; Dep Dir (AH) Incharge: Dr O P Dwivedi. Vaccines: Anthrax Spore, BQ, FD GTV, HS (AP/QA).

INDIAN VETERINARY RESEARCH INSTITUTE (IVRI), Biologicals Products Div, Izatnagar 243122; Gram: Sera, Tlx: 577-205; Dir: Dr P N Bhat, Ph: 74069; Head, Biological Products: Dr Y P Nanda, Ph: 74008, Gram: Sera. Immunobiologicals: Anthrax Spore, BQ, Brucella Strain 19, Br & Salmonella antigens and Sera, Clostridial Dis Vaccine, Distemper Vaccine, HS Adj, Johnin,

(Continued on page 651)

Government

Listed below are Central Government and other related organizations engaged in animal husbandry and veterinary services, livestock production and dairy development.

Area: 3,287,263 sq km (24 States & 7 Union Territories)

Population: 776 million

Cattle Population: 191 million

Milch Cows: 50.7 million

Milch Buffaloes: 28.3 million

Milch Production: 43.9 million

Per Capita: 157 gms/day

Capital: NEW DELHI

MINISTRY OF AGRICULTURE, Department of Agriculture & Cooperation, Krishi Bhavan, New Delhi 110001; Ph: 388911, Gram: Agr-india-A, Tlx: 031-65054 AGRI IN.

Minister for Agriculture: G S Dhillon, Ph: 381129

Minister of State for Agriculture: Yogendra Makwana, Ph: 382113

Secretary: C Srinivasa Sastry, Ph: 382651

Addl Sec: K N Ardhanareeswaran, Ph: 384468

Addl Sec: Dr P V Shenoi, Ph: 383830

Addl Sec: Mrs Usha Vohra, Ph: 382219

ANIMAL HUSBANDRY DIVISION

Animal Husbandry Commissr: Dr A K Chatterjee, Ph: 382608, resi: 604432

Dep Sec: K C Dehury, Ph: 381311, resi: 672709

Livestock Production — Jt Commissr (LP):

Dr A N Ghosh, Ph: 384553, resi: 675690;

Jt Commissr (CBF): Dr B S Kaushal, Ph:

389301, resi: 674717; Jt Commissr (Sheep):

Dr A K Basuthakur, Ph: 386053, resi:

679199; Jt Commissr (Poultry): Dr B S

Rao, Ph: 389856, resi: 361333; Dep

Commissr (Cattle Dev): Dr B S Mathur, Ph:

384960; Dep Commissr (ICDP): Dr V N

Sharma, Ph: 389524; Dep Commissr (Herd

Book): Dr N K Kulkarni, Ph: 382863; Asst

Commissr (Farms): Dr A Batobyal, Ph:

389432; Asst Commissr (AG): Dr P C Dash,

Ph: Ext 715; Asst Commissr (Cattle):

Dr Harpal Singh, Ph: Ext 750.

Livestock Feeds & Fodders — Dep Commissr

(F&F): Dr V G Gawai, Ph: 381557; Asst

Commissr (CDG): R S Sangwan, Ph: Ext 715.

Livestock Health — Jt Commissr (LHS): Dr S C Mathur, Ph: 384858, resi: 605650; Dep Commissr (LH): J S Uppal, Ph: 389606; Consultant: Dr J M Lall.

Animal Quarantine & Certification Service, Delhi-Gurgaon Rd, Kapashera Vill, Delhi; Asst Commissr (AQ) i/c: Dr D Krishnan, Ph: 393271, 389419 (Krishi Bhavan)

Meat & Meat Products — Jt Commissr:

Dr (Mrs) Usha Mandakhot; Dep Commissr:

Dr G S Singh; Asst Commissr: Dr A K

Khosla.

Animal Husbandry Statistics — Jt Dir: A S Chopra, Ph: 386244; Dep Dirs: K R Prasad, Ph: Ext 762, S P Singh, Ph: 384858, C L Malik, Ph: 381557, Mrs Madhu Bala, Ph: 389438.

Trade Div — Jt Sec: B C Sarma, Ph: 382354;

Dir: G Ramachandran, Ph: 389041, resi:

5728244.

Credit Div — Jt Sec: S Som, Ph: 383704;

Dir: N K Garg, Ph: 381012, resi: 2241974.

International Coop Div — Dir: S S Ahluwalia, Ph: 386681.

Public Relations — Dir: S C Kacktwana, Ph: 382416, 381656, resi: 388741; Asst Information Offr: R K Jain, Ph: 382416.

DAIRY DEVELOPMENT DIVISION

Jt Sec (C&DD): L R K Prasad, Ph: 383228, resi: 385859

Dep Sec (DD): K G Krishnamoorthy, Ph: 384551, resi: 584030

Jt Commissr: Vacant

Dep Commissr (DP): B K Chatterjee, Ph: 383773, resi: 6446785

Asst Commissrs: M Dutta, Ph: 388911 Ext 747
& Madan Gopal, Ph: 389606, 388911 Ext 748
Dairy Engr (Mech): S L Tuli, Ph: 389606
Tech Offr (MP): K D Law, Ph: Ext 630
Tech Offr (DD): R S Saini, Ph: Ext 813
Tech Offr (Dairy): R P Kansal, Ph: Ext 439.

DEPARTMENT OF COOPERATION

Chief Dir (C): B K Sinha, Ph: 383309
Dirs (C): K Annakesavan, Mrs S Kumar, Ph:
388795, resi: 381624, R L Nagpal, Ph:
381809, resi: 601929.

DEPARTMENT OF RURAL DEVELOPMENT, Krishi
Bhavan, New Delhi 110001; Ph: 383911,
Gram: Vikas.

Sec: V C Pandey, Ph: 384467
Addl Sec: M Dandapani, Ph: 382408
Jt Sec (IRD): Inderjit Khanna, Ph: 382313
Jt Sec (LR): K B Saxena, Ph: 362396
Dir (RLEGP): Ms A K Ahuja, Ph: 381756
Dir (RWP): Ms Gauri Dhar, Ph: 384980
Animal Husbandry Cell — Block 11, CGO Com-
plex, Lodhi Rd, New Delhi 110003; Dep
Commissr: Dr Iqbaluddin, Ph: 362569

AGRICULTURAL FINANCE CORPORATION LIMITED,
Dhanraj Mahal, Chhatrapati Shivaji Maha-
raj Marg, PB No 422, Bombay 400039; Ph:
2028924, 2028966, 2022981, 2028987, Gram:
Agfincorp, Tlx: 011-5849 AFCCO; Chmn: Dr
G V K Rao; Mg Dir: B Venkata Rao, Ph:
2026771; Dir (Plg & Coord): B V S Baliga;
Dir (Projects): K Roy.

AGRICULTURAL & PROCESSED FOOD PRODUCTS
EXPORT DEVELOPMENT AUTHORITY, 105 New
Delhi House, 27 Barakhamba Rd, New Delhi
110001; Ph: 3312692, 3313954, Gram:
Apfeda, Tlx: 031-65182 FEDA IN; Chmn:
Kr Fateh Singh Jasol; Sec: P S Srini-
vasan, Ph (resi): 624243; Asst Sec: B K
Iyengar, Ph (resi): 663387.

BUREAU OF INDIAN STANDARDS, Manak Bhawan,
9 Bahadurshah Zafar Marg, New Delhi
110002; Ph: 331031, 3311375, Gram: Manak-
sanstha, Tlx: 031-65870; Agri & Food Div
— Dir: T Purnanandam, Ph: 3311128; Jt
Dir (Anim Feeds, Eqpt, etc): J K Bhav-
nani, Ph (resi): 5419239; Dep Dir
(Dairy): N K Grover.

COUNCIL FOR ADVANCEMENT OF PEOPLE'S ACTION
& RURAL TECHNOLOGY (CAPART), Guru Nanak
Foundation Bldg, New Mehrauli Rd, New
Delhi 110030; Dir-Gen: T Balakrishnan,
Ph: 665107; Dep Dir-Gen: A Rama Rao;
Dir: Dr Zafar Ali, Ph: 667643.

DIRECTORATE OF ECONOMICS & STATISTICS, Min-
istry of Agriculture, Krishi Bhawan, New
Delhi 110001; Ph: 388911; Eco & Statical
Adv: Dr G R Saini, Ph: 382719; Addl Eco
& Statical Adv: Dr I V Ranga Rao, Ph:
387280; Economist: V N Mishra, Ph:
Dep Eco & Stat Adv (ED): C D Sharma, Ph:
381523, resi: 674684; Librarian: Smt Anita
Sharma, Ph: 388911 Ext 408.

DIRECTORATE OF EXTENSION, Dept of Agri &
Coop, Ministry of Agri, West Block No 8,
R K Puram, New Delhi 110066; Jt Sec
(Extn): K R Nair, Ph: 387804; Jt Commissrs
(Extn): Dr C S S Rao, Ph: 382543; N Peru-
mal, Ph: 602649; Dir of Admn: R G Baner-
jee, Ph: 384180; Dir, Extn Trg Unit: Dr
Dr Amar Singh, Ph: 602649; Dir (Farm
Info): Smt M Jaganathan, Ph: 603565; Dir
(Field Extn Unit): Dr S L Ghoshal, Ph: 604839.

DIRECTORATE OF HEALTH SERVICES, Nirman Bha-
wan, A Wing, New Delhi 110011; Ph: 3018988;
Dir-Gen: Dr M D Saigal, Ph: 3018438; Asst
Dir-Gen (PFA): J C Jaisani, Ph off: 3012290,
resi: 5435502; Asst Sec (PFA): Smt Debi
Mukherjee, Ph: 301-7212; Tech Offr (PFA):
A K Shrivastav, Ph: 3018988 Ext 298.

INDIAN AGRICULTURAL STATISTICS RESEARCH
INSTITUTE (IASRI), Library Avenue, New
Delhi 110012; Ph: 587121; Dir: Dr Prem
Narain, Ph: 581479; Head, Anim Scs: Dr
J P Jain, Ph: 583398.

INDIAN COUNCIL FOR AGRICULTURAL RESEARCH
(ICAR), Krishi Bhawan, New Delhi 110001;
Ph: 388991; Dir-Gen: Dr N S Randhawa, Ph:
382629; Dep Dir-Gen (Anim Scs): Dr R M
Acharya, Ph: 382545; Editor (Anim Scs):
R R Lokeshwar, Ph: 5721004; PRO: S K
Sharma, Ph: 389106; Chief Librarian: S
Moitra, Ph: 389570.

MILITARY FARMS DIRECTORATE, Quartermaster
General's Branch, Army Headquarters, West
Block 3, Wing 7, 1st Floor, R K Puram,
New Delhi 110066; Ph: 606611; Dep Dir Gen
Military Farms: Brig G L Luthra, Ph off:
606543, 606611 Ext 242, resi: 500966; Dir,
Military Farms: Col K A Patil, Ph off:
606611 Ext 243, resi: 391781; Jt Dirs:
Lt Col B I S Grewal, Ph: 606611 Ext 354;
Lt Col Rajinder Singh, Ph: 606611 Ext 244.

NATIONAL BANK FOR AGRICULTURE AND RURAL
DEVELOPMENT (NABARD), Sterling Centre,
Shivsagar Estate, Dr A B Rd, PB No 6552,
Worli, Bombay 400018; Ph: 4924306-9, Gram:
Agrefinans, Tlx: 11-73770 NAB IN; Chmn: R
K Kaul, Ph: 4923006; Mg Dir: G P Bhawe,
Ph: 4938627; Gen Mgrs (Tech): Dr B S
Sathe, Dr V S Motial. Regional Offices —
Ahmedabad: Nanalal Chambers, Ashram Rd,

PB No 8, -380009; Ph:402257-9; Bangalore: No 1 Queen's Rd, Indian Express Bldg, -560001; Ph: 75003, 72300; Bhopal: Guru Nanak Complex, 34 Malviya Nagar, PB No 31, -462003; Ph: 65439-40; Bhubaneswar: 122A Station Square, PB No 179, -751001; Ph: 52892, 55747; Calcutta: 4 Red Cross Place, PB No 71, -700001; Ph: 234437; Chandigarh: Kalsi Bldg, SCO 179-180, Sector 17-C, PB No 35, -160017; Ph:26817, Gen Mgr: P M Joshi; Guwahati: Laxmi Bhan, Pan Bazar, Dr J C Das Rd, -781001; Ph: 31560, 31979; Hyderabad: Pioneer House, 6-3-653, Somajiguda, -500482; Ph: 36613; Jaipur: Subhash Marg, C Scheme, PB No 10, -302001; Ph: 61808, 73498; Lucknow: Commerce House, Habibullah Estate, 11 M G Marg, PB No 364, -226001; Ph: 47236; Gen Mgr: S C Pant; Madras: 499 Anna Salai, Teynampet, PB No 1058, -600018; Ph: 450068; New Delhi: Express Bldg (Annexe), Bahadur Shah Zafar Marg, -110002; Ph: 3319669, 3311421; Patna: Maurya Lok Complex, Block B, Dak Bungalow Rd, PB No 178, -800001; Ph: 32470-480; Pune: 54 Wellesley Rd, PB No 5, Shivaji Nagar, -411005; Ph: 56014-18; Srinagar: Irrum Chambers, Opp IGP's Office, Nar-singh Garh, Karan Nagar, -190010; Ph: 75662; Trivandrum: Corporation Bldg -Annexe, PB No 6505, Vikas Bhavan PO, -645036; Ph: 63861, 66174.

NATIONAL COOPERATIVE DAIRY FEDERATION OF INDIA LTD, Post Box No 79, Anand 388001, Gujarat; Ph: 3002 to 3011, Gram: Apex-dairy, Tlx: 0172-207, 0172-227; Chmn: Dr V Kurien; Mg Dir: Dr A A Chothani; Offr on Spl Duty: K Sivakumar; Asst Mgr (Accts & Admn): Rakesh Kumar.

NATIONAL COOPERATIVE DEVELOPMENT CORPORATION, 4 Siri Institutional Area, Behind Hauz Khas, New Delhi 110016; Ph: 666032, Gram: Copcorp, Tlx: 3559; Mg Dir: R V Gupta, Ph: 660314; Gen Mgr: S K Arora, Ph: 669247; Chief Dir (Mktg & Storage): Dr Mahendra S Pradhan, Ph: 665498, resi: 6412072; Consultant: Dr S P Sharma, Ph: 666032, resi: 511824.

PLANNING COMMISSION, Yojana Bhavan, Parliament St, New Delhi 110001; Ph: 385481; Adviser (Agri): Dr N Kanungo, Ph: 381953; Dep Adviser (Anim Husbandry): Dr B San-yal, Ph: 389742, resi: 608005; Sr Res Offr (AH): Dr B K Aggarwal, Ph:385481/407.

REMOUNT & VETERINARY CORPS, Wing No 2, 1st Floor, West Block 3, R K Puram, New Delhi 110066; Ph: 606611 (PBX); Addl Dir-Gen: Maj Gen R K R Balasubramanian, AVSM,

Ph off: 603832, resi: 616547; Dirs: Col R N Kacker, Ph off: 606611 Ext 263, resi: 394159, Col G S C Ranga Rao, Ph off: 606611 Ext 279, resi: 383353, Col B Ramachandra Rao, Ph off: 606611 Ext 277; Jt Dirs: Lt Col S Thomas, Ph: Ext 556, Lt Col J S Bhalla, Ph: Ext 276; CSO: Dr T C Tewatia, Ph: Ext 276; VO: Maj V N Kapre, Ph: Ext 556.

SMALL INDUSTRIES DEVELOPMENT COMMISSIONER, Ministry of Industry, Nirman Bhavan, 7th Floor, Maulana Azad Rd, New Delhi 110011; Ph: 3019311, Tlx: 031-66259 DCSI IN; Addl Sec & Dev Commr: N Raghunathan, IAS, Ph: 3018315; Dir (Food): S P Sondhi, Ph: 3019221, resi: 593954.

SMALL INDUSTRIES SERVICES INSTITUTE, Ministry of Industry, Okhla, New Delhi 110020; Ph: 6838118; Dir: D S Chauhan, Ph: 631318; Dep Dir (Food): S Kankan.

VETERINARY BIOLOGICALS (Continued from page 648)

Lap Swine Fever, Mallein, Rabies, Sal. ab. equi, TCRP, TC Sheep Pox, Tuberculin PPD.

WEST BENGAL

INSTITUTE OF ANIMAL HEALTH AND VETERINARY BIOLOGICALS, Directorate of Vet Services, Govt of West Bengal, 37 Belgachia Rd, Calcutta 700037; Ph: 528032, Gram: Vet-vax; Jt Dir: Dr Jahar Lal Ganguli. Vac-cines: Anthrax Spore, HS, BQ, RP (FD GTV).

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NATIONAL DAIRY DEVELOPMENT BOARD

NATIONAL DAIRY DEVELOPMENT BOARD (NDDB),
Post Box No 40, Anand 388001, Gujarat;
Ph: 3002 to 3011, Gram: Dairyboard,
Telex: 0172-207.
Chairman: Dr V Kurien
Secretary: Dr (Miss) Amrita Patel
Addl Secretary: R S Pal
Board Members: Dr V Kurien (Chairman),
Dr R P Aneja; Addl Sec to GOI, Ministry
of Agri; Dr I Z Bhatta; T C Srinivasa-
ramanujan, Dr (Miss) Amrita Patel.

DIVISIONS

Applied Research & Development — Hon
Adviser: Dr A P Mahadevan; Dep Dir:
Dr Shyam S Chaudhry; Sr Proj Exec
(Oil Lab): U S Vellal.
Computer Services — Dir: P N Daulatjada;
Sr Proj Execs: Shyamal Ghosh, A S Abani.
Coordination/MIS — Head: N K Chawla; Dep
Dir: S D Burde; Sr Proj Exec (MIS): N V
Naithani.
Engineering — Dir: D K Sen; Sr Proj Engrs:
S Janakiraman, S K Garg, Amreek Singh
Puri, V N Rao, V S Hebbar, V K Ghoda.
Farmers' Organisation Inputs & Training
(FIT) — Exec Dir: Dr M P G Kurup; Dir
(Manpower Dev): Dr S P Mittal; Dir
(National Milch Herd): Dr P N Roy Chou-
dhury; Sr Proj Execs (FO/Dairy): Dr P K
Sinha, Dr K K Bhardwaj; Sr Proj Exec
(FO/Vegetable Oil): Dr A K Srivastava;
Sr Proj Execs: S K Nandi, Dr B K Patnaik,
Dr V K Srivastava; Sr Proj Exec (Nutri-
tion): Dr P J George Kunju; Sr Proj Exec
(Systems): R Chakravarty; Proj Mgr (Tree
Growers' Coop Proj): V K Misra.
Gujarat Region — Dir: V S Behla.
Animal Disease Diagnostic Laboratory —
Epidemiologist: Dr H S Naik; Parasito-
logist: Dr D K Singh.
Planning — Dir: P C Bardhan; Sr Proj Exces:
N K Sinha, B K Ganguly.
Purchase — Dir: P G Gore; Sr Exec: S K Chede.
Administration — Dep Dir: K N Thomas; Sr
Proj Exec: George K.
Oilseeds & Vegetable Oil Wing — Dir:
Shailendra Kumar; Dep Dirs: I A Garate,
N M Prusty; Sr Proj Execs: N Haridasan,
R Mathur, A K Vaid, Shiladitya Roy,
S S Bhadauria, Dr M L Jhala.

Accounts — Treasurer: N K Jain; Asst Treas-
urer: S N Palsane; Sr Accts Execs: G C V
Rangam, S C Bansal, K Balasubramanian.
Internal Audit — Dir: H M Singhvi; Sr
Accts Exec: S K Basu.
Chairman's Office — D S Krishnamurthy, PS
to Chairman.
Secretary's Office — Dir: Jayant Chhaya.

REGIONAL OFFICES

NORTHERN REGION — Safdarjang Enclave, Post
Box No 4906, New Delhi 110029; Ph: 603169,
603964, 603796, 603327, Gram: Dairyboard,
Tlx: 031-3768; Exec Dir: Animesh Banerjee,
Ph: 602002; Dir (FIT): Dr E Madhavan; Sr
Proj Execs (FIT): Dr O P Tandon, Dr S C
Malhotra; Sr Proj Engrs: Rajeev Verma,
A S Garg, B M Agrawal, B H Santwani,
V D Joshi.

SOUTHERN REGION — Sabari Complex, 24 Resi-
dency Rd, Post Box No 2619, Bangalore
560025; Ph: 578951, 578952, Gram: Dairy-
board, Tlx: 0845-594; Dir: R K Nagar; Dep
Dir (Engg): P B Raut; Sr Proj Execs (FIT):
K V Vishvambharam, M J S Prakash Kumar,
J N Gupta, Dr N V Belavadi; Sr Proj Engrs:
S P De, D K Chakrabarti.

WESTERN REGION — Unit No 12, Aarey Milk
Colony, Goregaon (East), Bombay 400065;
Ph: 685603, 696336, Gram: Dairyboard,
Tlx: 011-3437; Dir: Dr S N Singh; Dep Dir
(Engg): S R Khanwalkar; Sr Proj Engrs:
Dr N Vishwanathan, A Srivastava, H H Soni;
Sr Proj Execs (FIT): Dr S G Naik, Dr N R
Tumkur, R K Nair, C M Maharishi.

EASTERN REGION — DK Block, Sector II, Salt
Lake City, Calcutta 700091; Ph: 370640/1/2,
350426, 361431, Gram: Dairyboard, Tlx:
021-7219; Dir: Dr B K Chakraborty, Ph
(resi): 370528; Dep Dir (Engg): P Chatter-
jee; Dep Dir (FIT): Dr R S Gill; Sr Proj
Engrs: A B Sanyal, T Chowdhuri, A K Sinha;
Sr Proj Execs (FIT): A Burman, Narendra
Singh.

OBJECTIVES

The National Dairy Development Board was constituted under the aegis of the Ministry of Agriculture, Government of India, in September 1965 to replicate the Anand Pattern dairy cooperatives in other parts of India in an effort to improve the incomes of the rural milk producers. The Board is registered under the Societies' Registration Act and the Bombay Public Trusts Act. The NDDB is today working in 164 milkshed-districts in 22 States and Union Territories in India. With this objective in view, the Board carries out the following activities.

- (i) Promotion of dairy science and practice and diffusion of technical know-how;
- (ii) Research in the field of dairying and animal husbandry;
- (iii) Promotion of, and research and development in, activities relating to production and marketing of agriculture and food products and extension of knowledge in the field of agriculture, animal husbandry, fisheries and other food products and to take all necessary steps in this direction by sponsoring, setting up, acquiring, constructing or installing any plant or work necessary for the purpose;
- To provide consultant's service to any dairy;
- To advise the Government of India, State Governments, Corporations or local bodies in setting up dairies, milk product factories, dairy extensions, rural milk creameries, cattle-feed compounding factories and other allied plants or industries;
- Collection of relevant data (through field survey and other means) required for dairy development in any area;
- Designing and planning any dairy or associated plant;
- Construction of any dairy or ancillary plants including civil works;
- Inspection or evaluation of any dairy project, including all integrated services, such as procurement of raw materials, transport, processing and distribution of milk products;

- To advise on dairy development;
- To advise on price fixation, price policy, public relations and allied subjects relating to dairies;
- Promotion of quality control of milk and milk products;
- Organising technical programmes for training of personnel;
- Drawing up of specifications, plant layout, performance schedule and cost estimates to suit the specific needs of individual dairies and/or other allied plants and industries;
- Cooperation with foreign experts, particularly with the Food & Agriculture Organisation, United Nations Children's Fund, United States Agency for International Development, Canadian International Development Agency and other international organisations;
- Preservation and improvement of cattle for the greater production of milk and/or increase of draught power;
- To promote the dairy industry generally;
- To sponsor, promote, manage, set up, acquire, construct or install any plant or works which directly or indirectly promotes or advances projects or general public utility (not involving any activity for profit), relating to dairying, animal husbandry, food and agriculture, fisheries and cold storage and to make, recommend, submit and draw plans, schemes and reports for such projects and to provide for detailed implementation and execution of such projects including dealing with surplus, if any, accidentally arising from such activities as mentioned above;
- To adopt and undertake any other measures or perform any other duties as may be required by the Government of India or by a State Government or which the Board may consider necessary or advisable in order to carry out any of the objectives of the Board;
- To perform all such other functions either along or in conjunction with others as the Board may consider necessary, incidental or conducive to the achievement of the objectives of the Board.



Indian Dairy Corporation

INDIAN DAIRY CORPORATION (IDC), Registered
Office: Suraj Plaza-II, Sayajigunj, Magan-
wadi, Baroda 390005; Ph: 66635 to 66639,
Gram: Indairy, Tlx: 0175-239.

Hon Chairman: Dr V Kurien

Managing Director: Dr R P Aneja, Ph off:
66432, resi: 553642

Company Secretary: K R Venkataraman.

DIVISIONS

Finance & Accounts Div — Finance Dir: H K
Agrawal, Ph off: 63692, resi: 320172; Dep
Mgr (Finance): R N Jain.

Projects Div — Head: Dr R S Khanna, Ph resi:
21816; Dep Mgr (Projects): P V H Ramanan;
Dep Mgr (Data Process & Com Cell): K B R
Bhatia.

Monitoring Div — Head: Dr A K Joseph, Ph
resi: 324141.

Commodities Management Div — Head: Dr Nara-
yan Raj, Ph resi: 321454; Dep Mgr: M D
Mazumdar.

OBJECTIVES

Incorporated as a wholly Government-owned
company on February 13, 1970 with the
following major objectives: one, to act as a
financing and promotional institution, as
the Government of India may require, to help
expedite the nation's dairy development; and
two, to this end, to obtain funds, as
directed by the Government of India, to dis-
burse these funds for investment in dairy
development, and to monitor the progress and
effectiveness of the projects in which these
funds are invested.

REGIONAL OFFICES

Anand — c/o National Dairy Development
Board, Anand 388001; Ph: 3002 to 3011,
Gram: Dairyboard, Tlx: 0172-207; Head
(GR): V S Behla; Head (Coordination &
Monitoring): N K Chawla.

Bangalore — Sabari Complex, 2nd Floor, 24
Residency Rd, Bangalore 560025; Ph: 578951,
Gram: Indairy, Tlx: 0845-2594; Head: R K
Nagar, Ph resi: 579121.

Bombay — Rajmahal, 6th Floor, 84 Veer Nari-
man Rd, Bombay 400020; Ph: 2047897, 2040969,
Gram: Opflood, Tlx: 011-3437; Head (WR):
Dr S N Singh, Ph: 685603.

Calcutta — Block DK, Sector II, 3rd Floor,

Salt Lake City, Calcutta 700064; Ph:
370640/1/2, Gram: Dairycorp, Tlx: 021-
7219; Head (ER): Dr B K Chakraborty.

Madras — Mount View, 3rd Floor, 646 Mount
Rd, Madras 600006; Ph: 471815, Gram:
Opflood, Tlx: 041-7226; Offr Incharge:
P V K Panickar.

New Delhi — Post Bag No 2, Safdarjang
Enclave, New Delhi 110029; Ph: 603327,
603796, Gram: Dairycorp, Tlx: 031-3768;
Head (NR): A Banerjee; Dep Mgr: H S Behar,
Ph off: 600105, resi: 5416548.

OVERSEAS OFFICE

Brussels — 217, Chaussee, De Velurgat, 1050-
Brussels, Belgium; Ph: 6409734, Tlx: 46-
22510; Counsellor-cum-Chief, Overseas
Coordination: A K Banerjee, Ph resi: 6477550.

UNITS/SUBSIDIARIES

INDIAN IMMUNOLOGICALS, 11-4-657 Lakdikapul,
Hyderabad 500004; Ph: 37522, 224523, Gram:
Immune, Tlx: 0155-6501; Gen Mgr: N Viswa-
nath, Ph resi: 224511.

This vaccine plant a unit of IDC is set
up with process know-how from Wellcome
Foundation Ltd, UK. It has a capacity to
produce 25 million quadrivalent doses of
Foot and Mouth Disease (FMD) Vaccine.

INDIAN DAIRY MACHINERY COMPANY, C-1/11-12
GIDC Indl Estate, Vithal Udyognagar 388121
Ph: 7490, 7831, 7974, Gram: Indmac, Tlx:
0172-206; Proj Mgr: Mahesh Chandra.

This unit of IDC has been set up for manu-
facturing dairy equipments. It is engaged
in designing, fabrication and erection of
specialised equipment.

HINDUSTAN PACKAGING COMPANY LTD, Near Itola
Rly Station, Itola, Baroda 391240; Ph: 22
(POR), 554550 (Baroda Ex), Gram: Hindpack,
Tlx: 0175-267 HDPC IN; Factory Mgr: S L
Taneja. Regd Off: NDDDB Campus, Anand.

It was registered as a subsidiary company
of IDC in October 1985. Established in
collaboration with Tetra Pak Development
Ltd, Switzerland for production of lami-
nated paper for aseptic packaging of milk,
the plant has a capacity to produce 7,650
tonnes of laminated paper. Aseptic milk
packaging stations at Surat, Jaipur,
Indore, Sangamjagarlamudi (Guntur Dist)
and Baroda are functioning.

State Governments

The organization of dairy development, animal husbandry and veterinary services departments/directorates in the States is listed below, statewise. Basic data pertaining to land area, human population (1985), breedable cow and buffalo population (1982-84) and estimated annual milk production (1985-86), are also indicated at the beginning of each State. Further, information on breeding farms, semen banks, feed units, disease-diagnostic labs and veterinary biologicals are listed separately in this Directory Section.

Andaman & Nicobar

Area: 8,249 sq km Population: 188,741
Capital: PORT BLAIR
Cows: 36,000 Buffaloes: 12,000
Annual Milk Production: 13,500 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY & VETERINARY SERVICES, PB No 25, Port Blair 744101; Ph: 2326, 2796, Gram: Dirvet.
Dir: Dr V Nagarajan, Ph off: 2326
Cattle Dev Offr: Dr S Raunaq Hussain
Zonal Offices — Andaman: Mayabunder; Cattle Dev Offr: Dr S Raunaq Hussain; Nicobar: Car Nicobar; Cattle Dev Offr: Dr Sunder Singh.
Disease Investigation Offr: Dr Balakrishnan
Statistical Offr: S K Tripathi
Key Village Centres — Navy Bay: Port Blair; Rangat: Middle Andaman.

Andhra Pradesh

Area: 275,068 sq km Population: 53,549,673
Capital: HYDERABAD
Cows: 13,117,000 Buffaloes: 8,724,000
Annual Milk Production: 2,800,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Shantinagar, VBRI Compound, Hyderabad 500028; Ph: 36852.
Dir: Dr K Hanumantha Rao, Ph off: 37297, resi: 37596

Addl Dir (Production): Dr Vishvaraj, Ph off: 36852, resi: 62734
Jt Dir (Planning): Dr S Prabhakar
Jt Dir (DPAP): Dr Y Umamaheswara Rao
Jt Dir (Fodder): Dr M Satyanarayana, Ph off: 36852, resi: 823489
Jt Dir (Sheep): Dr M M H Siddiqui
Dep Dir (Statistics): Dr S Radhakrishna
Dep Dir (Epid): Dr S Ramanatham
Dep Dir (Pub & Extn): Dr P Ramakrishna
Asst Dir (Tech): Dr Mohd Nissar Hussain
Asst Dir (Farms): Dr P Sudhakar Reddy
Asst Dir (Statistics): Dr Lakshminarayana
Regl Jt Dirs — Hyderabad: Dr M Yogi Reddy, Ph: 36746; Kakinada: Dr P Mallikarjuna Rao, Ph: 3651; Karimnagar: Dr Rajeswara Rao, Ph: 2698; Khammam: Dr K Ramachandraiah (I/c), Ph: 8564; Nellore: Dr J Rama Mohan Rao, Ph: 3394; Nizamabad: Dr M Narayana Reddy (I/c), Ph: 476; Vijayawada: Dr K Sankaram, Ph: 75711.
Jt Dirs (AH) — Anantapur: Dr Rajasekhara Naidu, Ph: 3264; Chittoor: Dr C Sivaramakrishnaiah, Ph: 2379; Cuddapah: Dr K Viswanath Pillai, Ph: 2525; Kurnool: Dr Syed Nasseruddin, Ph: 21137; Mahaboobnagar: Dr K Venkateswara Rao, Ph: 2291.
Dep Dirs (AH) — Adilabad: Dr N Venkatanarsaiah, Ph: 484; Eluru (W G Dist): Dr S Venkateswara Rao, Ph: 20998; Guntur: Dr V Subba Rao, Ph: 21309; Medak: Dr P Achambhotlu; Nalgonda: Dr R C Vijayasarithi, Ph: 408; Ongole: Dr K Rama Rao; Ranga Reddy: Dr Hemraj, Ph: 477; Srikakulam: Dr S Madhusudhana Rao, Ph: 418; Vizag: Dr G S Sitharaman; Vizianagram: Dr Y Narayana Murthy, Ph: 3364; Warangal: Dr M A Haleem, Ph: 7307.
Special Livestock Production Programme (SLPP) — Anantapur: Jt Dir: Dr Rajasekhara Naidu; Chittoor: Dep Dir: Dr Sivaramakrishnaiah; Cuddapah: Jt Dir: Dr K Viswanatha Pillai; East Godavari (Kakinada): Dep Dir: Dr Narsimlu Naidu; Karimnagar: Regl Jt Dir: Dr Rajeswara

Rao; Khammam: Dep Dir: Dr Ramachandra
 Rao; Kurnool: Dep Dir: Dr K V Ramana
 Reddy; Mahaboobnagar: Jt Dir: Dr K Ven-
 kateswara Rao; Nalgonda: Dep Dir: Dr C
 Vijayasarithi; Nellore: Jt Dir: Dr A Y
 Krishna; Nizamabad: Dep Dir: Dr M Narayan
 Reddy; R R Dist: Dep Dir: Dr Hemraj; Sri-
kakulam: Dep Dir: Dr S Madhusudhana Rao;
Visakhapatnam: Dep Dir: Dr G S Sitharaman;
Warangal: Dep Dir: Dr M A Haleem.

Drought Prone Area Programme Centres (DPAP)

-- Anantapur: Jt Dir: Dr Rajasekhara
 Naidu; Chittoor: Jt Dir: Dr Sivarama
 Krishnaiah; Cuddapah: Jt Dir: Dr K
 Viswanath Pillai; Kurnool: Jt Dir: Dr
 Syed Naseeruddin; Mahaboobnagar: Jt Dir:
 Dr K Venkateswara Rao; Nalgonda: Dep
 Dir: Dr Vijayasarithi; Prakasam: Dep Dir:
 Dr K Rama Rao; R R Dist: Dep Dir: Dr
 Hemraj.

Arunachal Pradesh

Area: 83,743 sq km Population: 631,839

Capital: ITANAGAR

Cows: 168,000 Buffaloes: 12,000

Annual Milk Production: 37,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY & VETERI-
 NARY SERVICES, Nirjuli, Via Naharlagun
 791110; Ph: 303, Gram: Vatarun.

Dir: Dr G C Kakati, Ph off: 303, resi: 231
 Jt Dir: Vacant

Dep Dir (AH & Prod): Dr K R Deori, Ph off:
 25, resi: 32

Dep Dir (Anim Health): Vacant

Fodder Dev Offr: S P Thapa

Disease Investigation Offr: Dr D Shyam,
 Ph off: 36

Asst Rinderpest Offr: Dr D K Chetia

Dist AH & Vet Offrs -- Along 791001, West

Siang Dist: Dr B N Tamuli; Bomdila:

790001, West Kameng Dist: Dr P C Raj-

kumar, Ph: 95, resi: 70; Changlang,

Tirap Dist: Dr R K Shyam; Daporijo

791122, Upper Subansiri Dist: Dr U K

Phukan, Ph: 78; Khonsa, Tirap Dist: Dr

B R Bora, Ph: 53; Pasighat, East Siang

Dist: Dr B Deori, Ph: 98; Roing, Dibang

Valley Dist: Dr K K S Nair; Seppa, East

Kameng Dist: Dr S N Saikia, Ph: 90,

resi: 82; Tawang 790104: Dr J Bora; Tezu
 792001, Lohit Dist: Dr P K Sharma, Ph:
 65, resi: 20; Ziro 791120, Upper Suban-
 siri Dist: Dr G C Gohian, Ph: 84, resi: 85.
 Key Vill Centre -- Pasighat 791102, East
 Siang Dist; Incharge: Dr S Home.

Assam

Area: 78,438 sq km Population: 19,896,843

Capital: DISPUR

Cows: 6,750,000 Buffaloes: 767,000

Annual Milk Production: 5,92,000 tonnes

DAIRY DEVELOPMENT DEPARTMENT, Khanapara,
 Guwahati 781022; Ph: 87117.

Dir: Dr Abdus Sattar, Ph off: 87117,
 resi: 23774

ANIMAL HUSBANDRY & VETERINARY DEPARTMENT,
 M C Rd, Guwahati 781003; Ph: 24609, Gram:
 Veterinary.

Dir: Dr Jogananda Das, Ph off: 24609,
 resi: 27486

Addl Dir (SLPP): Vacant, Ph: 28389

Jt Dir (AHA): Dr Abdul Raquib, Ph: 27418

Jt Dir (TSP): Dr Debeswar Barthakur,
 Ph: 27419

Jt Dir (HQ): Dr Chandra Kant Goswami,
 Ph: 25440

Dep Dir (ICDP): Dr Biseswar Dutta

Dep Dir (Fodder): Dr A K Baruah

Dep Dir (SLPP) Health: Dr S P Neog

Dep Dir (SLPP) Breeding: Vacant

Credit Planning Offr (SLPP): Dr Takiuddin
 Saikia

Spl Offr (Planning): Dr Kumud Hazarika

Asst Dir (Monitoring): Dr Majibur Rahman

Livestock Production Offr: Dr Dolon Dutta

Census Offr: Vacant

Cattle Sterility Offr: Vacant

Information Offr I/c: Dr J C Saikia

Sr Res Offr (Stats): Bipul Kumar Bora

Exec Engr: C N Barsaikia, Ph: 27705

Registrar: S N Boro

Addl Dir (Hills), Haflong: Dr Parikshit Das

Jt Dir, Guwahati Zone: Dr Mafizuddin Z
 Hazarika, Ph: 24946

Jt Dir, Jorhat: Dr P N Saikia, Ph: 126

Jt Dir, Silchar: Dr Monibhusan Laskar,
 Ph: 252

Jt Dir (FS): Vacant, Ph: 87427
 Dep Dir (ICDP & FSC): Dr Khagen Baruah
 Dep Dir (BCPP): Dr Chinmoy Das, Ph: 87105
 Dep Dir (Rinderpest): Dr M Ali, Ph: 25692
 Dep Dir (Epidemiology): Dr B N Talukdar
 Chief Chemist: Dr Jugal Saikia
 Spl Offr (SLPP, Guwahati): Dr B N Baruah
 Spl Offr (SLPP, Dhubri): Vacant
 Spl Offr (SLPP, Nagaon): Dr G C Phukan
 Information/Publicity Offr Incharge:
 Dr J C Saikia

Key Vill Offr: Dr K K Das, Ph: 24844
 Intensive Cattle Development Projects (ICDP)
 — Officer Incharge — Demow: Dr N C
 Gogoi; Kokrajhar: Dr S C Talukdar; North
 Lakhimpur: Dr T N Mohan; Silchar: Dr
 Subimal Dutta; Tezpur: Dr Golap Ch Bora;
 Tinsukia: Dr P Handique.

Dist AH & Vet Offrs — Barpeta: Dr H N Sarma,
 Ph: 34; Cachar (Hills): Dr D Paul, Ph:
 269; Darrang (Mangaldoi): Dr A J Abdullah,
 Ph: 9; Dhubri: Dr B N Bardoloi, Ph: 774;
 Dibrugarh: Dr N C Baruah, Ph: 240; Goal-
 para: Dr U K Barman, Ph: 112; Jorhat:
 Dr G C Baruah, Ph: 126; Kamrup: Dr B N
 Gohain, Ph: 24867; Karbi Anglong (Diphu):
 Dr R N Shome, Ph: 252; Karimganj: Dr A
 Paul; Kokrajhar: Dr A Kalam; Lakhimpur:
 Dr K C Sarma, Ph: 30; N C Hills (Haf-
 long): Dr T Buragohain, Ph: 11; Nagaon:
 Dr I Hussain, Ph: 213; Sibsagar: Vacant,
 Ph: 116.

Key Vill Centres — Abhayapuri, Barhampur,
 Bhergaon, Bhogabazar, Bilashipara, Boko,
 Charaibahi, Dhubri, Dotoma, Dudhnoi,
 Goalpara, Hojai, Kaliabor, Kamrup, Kokra-
 jhar, Lahorighat, Lanka, Manikpur, Now-
 gong, Panbari, Rupahi.

Bihar

Area: 173,877 sq km Population: 69,914,734

Capital: PATNA

Cows: 16,359,000 Buffaloes: 4,622,000

Annual Milk Production: 2,520,000 tonnes

ANIMAL HUSBANDRY DEPARTMENT, New Secretariat,
 Patna 800015; Ph: 24902, Gram: Pasupalan.

Dir: Dr H S Sinha
 Jt Dir (HQ): Dr R S Sharma
 Jt Dir (Anim Health): Vacant
 Jt Dir (Fodder): Dr R R Ram

Jt Dir (Proj & Plg): Dr S B Choudhary
 Spl Dir (Stats): K K Shrivastava
 Dep Dir (Credit & Plg): Dr R Ram
 Dep Dir (Sheep & Goat): Dr J Prasad
 Dep Dir (HQ): Dr K N Jha
 Regl Dirs — Bhagalpur: Dr S M Hamid, Ph:
 84; Chotanagpur (North), Hazaribagh:
 Dr K D Prasad, Ph: 2724; Chotanagpur
 (South), Ranchi: Dr (Capt) J P Verma;
 Darbhanga: Dr B D Sinha, Ph: 2250; Koshi
 Range, Saharsa: Dr P S Sahay; Magadh
 Range, Gaya: Dr S M Ram; Muzaffarpur:
 Dr R Singh, Ph: 2249; Patna Range, Patna:
 Dr S S Mishra, Ph: 22996, resi: 31456;
 Santhal Pargana, Dumka: Dr S M Thakur;
 Saran Range, Chapra: Dr B N Verma, Ph:
 2461.

Dist AH Offrs — Aurangabad: Dr Rebati
 Raman Singh; Begusarai: Dr B P Yadav,
 Ph: 200; Bhagalpur: Dr Sukheshwar Prasad,
 Ph: 920; Bhojpur (Arrah Dist): Dr Nasir
 Ahmad, Ph: 444; Champaran (East): Dr Gaj-
 endra Mohan Kumar; Champaran (West): Dr
 T N Prasad; Darbhanga: Dr Alakh Kumar
 Sinha, Ph: 2180; Deoghar: Dr S R Banerjee;
 Dhanbad: Dr R D Pathak; Gaya: Dr K B
 Sinha, Ph: 302; Godda: Dr B P Pandey;
 Gopalganj: Dr Jai Ram Prasad; Hazaribagh:
 Dr Akchay Bat Sinha, Ph: 2438; Kaithar:
 Dr S N Jamuhar; Khagaria: Dr Manoranjan
 Prasad, Ph: 83; Lohardagga: Dr Narendra
 Kumar Verma; Madhepura: Dr Indrabhan
 Singh; Madhubani: Dr J P Yadav; Munger:
 Dr N M Ansari, Ph: 2280; Muzaffarpur:
 Dr Jagdish Prasad, Ph: 2481; Nalanda:
 Dr Chhote Lal Chaudhary, Ph: 216; Nawada:
 Dr Guneshwar Sinha, Ph: 73; Palamau:
 Dr Prahmeshwar Prasad Sinha; Patna: Dr B
 K Sinha, Ph: 25306; Purnea: Dr E N Upa-
 dhaya, Ph: 90; Ranchi: Dr Kashi Nath
 Singh; Rohtas: Dr S P Pandey, Ph: 229;
 Saharsa: Dr E K Jha, Ph: 64; Sahebganj:
 Dr Pandey C P Sharma; Samastipur: Dr
 Zafar Imam, Ph: 578; Santhal Parganna:
 Dr Raj Kishor Prasad; Saran: Dr R P
 Yadav, Ph: 461; Singhbhum: Dr Gauri
 Shanker Prasad; Sitamarhi: Dr Narmadeshwar
 Singh; Siwan: Dr Saukat Ali Khan, Ph: 87;
 Vaishali: Dr Chandradip Sinha.

DAIRY DEVELOPMENT DEPARTMENT, Govt of Bihar,
 Vikas Bhavan, Patna 800001.
 Dir: A P Sinha.

Chandigarh

Area: 114 sq km Population: 451,610
Cows: 6,000 Buffaloes: 19,000
Annual Milk Production: 25,000 tonnes

OFFICER INCHARGE, Animal Husbandry, Union Territory of Chandigarh: Dr Jagdish Kochar, c/o Vet Hospital (Pet Animals), Sector 22, Chandigarh; Ph: 26541.

Dadra & Nagar Haveli

Area: 491 sq km Population: 103,676
Capital: SILVASSA
Cows: 44,000 Buffaloes: 4,000
Annual Milk Production: 2,000 tonnes

ANIMAL HUSBANDRY DEPARTMENT, Silvassa 396230.

AH-cum-Vet Offr: Dr M S Khan.

Delhi

Area: 1,483 sq km Population: 6,220,406
Cows: 51,000 Buffaloes: 176,000
Annual Milk Production: 1,98,000 tonnes

ANIMAL HUSBANDRY DEPARTMENT, Delhi Administration, Old Secretariat, Delhi 110054; Ph: 2512285.

Dep Dir: Dr Shivender Singh, Ph: 2512285
AH Expert: Dr Lachman Singh, Ph: 2512285
Gaushala Dev Offr: Dr J D Verma, Ph: 672161
Asst Res Offr (C): S M Dahiya
Offr Incharge (Semen Bank): Dr Devendra Nath, Ph: 2512285
Asst Dir (Masoodpur Dairy Farm): Dr D R Dass
Res Offr: A L Chawla, Ph: 2512285
Dairy Colonies — Gazipur, Gharoli, Goela, Jharoda, Kakrola, Madanpur Khadar, Masoodpur, Nangli Sakrawati.

AI Centres — Bijwasan, Jheel Khurenja, Moti Bagh, Najafgarh, Nangloi, Tis Hazari.

Goa

Area: 3,814 sq km Population: 1,086,730
Capital: PANAJI
Cows: 130,000 Buffaloes: 44,000
Annual Milk Production: 28,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY & VETERINARY SERVICES, Panaji 403001; Ph: 5381, 5591, Gram: Veterinary.

Dir: Dr A S Wagle, Ph: 5381
Dep Dir (AH): Dr K R Shastri
Dep Dir (Ext): Dr Leo Pinto
Dep Dir (PMC): Dr A Sami
Dairy Dev Offr: Bekal Niranjana
Supdt (Dhat Farm): Dr B R Chowgule
Supdt (Copardem Farm): Dr P K R Vaidhyan
Key Vill Offr: Dr A V Khandeparkar
Proj Offr: Dr V J Thomas
Regl Offices — Bicholim, Canacona, Cuncolim, Daman, Diu, Mapusa, Margao, Mollem, Netravali, Pernem, Ponda, Quepem, Sanguem, Usgao, Valpoi, Vasco-da-Gama.
AI Centres — All 13 taluka headquarters.

Gujarat

Area: 196,024 sq km Population: 34,085,799
Capital: GANDHINAGAR
Cows: 6,994,000 Buffaloes: 4,443,000
Annual Milk Production: 3,200,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Krishi Bhavan, Paldi, Ellisbridge, Ahmedabad 380006; Ph: 79601, 79602, Gram: Pashupalan.
Dir: Dr C H Joshi, Ph off: 78447, resi: 403887
Jt Dir (AH & Spl Programmes): Dr S H Dhulkhed
Ph: 78216
Jt Dir (Plg & Coord): Dr C H Joshi
Jt Dir (Dairy): Dr B P Pandya, Ph: 406773
Dep Dir (Anim Health): Dr S T Pandya

Cattle Dev Offr: Dr A S Vyas
 Tech Offrs (Monitoring): Dr K S Patel,
 Dr S C Patel
 Regl Offices — Ahmedabad: 0-12 New Mental
 Hospital Annexe, -380016; Ph: 66256;
 Regl Jt Dir: Dr G Y Umergi; Rajkot:
 Multistoreyed Bldg; Ph: 40488; Regl Jt
 Dir: Dr D R Purohit; Vadodara: Alembic
 Rd; Ph: 63357; Regl Jt Dir: Dr B R Konnur
 Dist AH Offrs — Ahmedabad: Bhadra; Dr S N
 Bhatt, Ph: 395140; Amreli: Dr P S Sol-
 anki, Ph: 2493; Banaskantha: Palanpur;
 Dr C B Patel, Ph: 2635; Bharuch: Dr G V
 Raval, Ph: 196; Bhavnagar: Dr A M Rawal,
 Ph: 26951; Dangs: Ahwa; Dr H M Pardeshi,
 Ph: 41; Gandhinagar: Dr A M Doi, Ph:
 2647; Jamnagar: Dr L K Upadhyay, Ph:
 72396-7; Junagadh: Dr N J Mehta, Ph: 162;
Kaira: Dr A K Antani, Ph: 3404; Kutch:
 Dr R L Kerur, Ph: 117; Mehsana: Dr J R
 Vyas, Ph: 2691; Panchmahal: Godhra;
 Dr K R Date, Ph: 2483; Rajkot: Dr N D
 Vyas, Ph: 26785; Sabarkantha: Himat-
 nagar; Dr H G Joshi, Ph: 188; Surat:
 Dr H R Mangoli, Ph: 25751; Surendranagar:
 Dr G H Murnal, Ph: 561; Vadodara: Dr A S
 P Saiyed, Ph: 556949; Valsad: Dr V R
 Kulkarni, Ph: 2497.
 Intensive Cattle Development Projects (ICDP)
 — Ahmedabad: Vishvanath Bhavan, Near
 Town Hall, Ellisbridge; Ph: 77961; Proj
 Offr: Dr S J Patel; Mehsana: Highway Rd;
 Ph: 20962; Proj Offr: Dr J M Vyas; Raj-
kot: Red Club Rd; Ph: 43788; Proj Offr:
 Dr C M Pandya; Surat: Multistoreyed
 Bldg; Ph: 29935; Dr G D Modi; Vadodara:
 Salatwada Rd; Ph: 43256; Dr Jacob.
 Key Vill Centres — Amreli, Bhavnagar,
Godhra, Junagadh, Mahuva.
 Urban AI Centres — Bharuch, Bulsar, Rajkot.
 Non-Operation Flood Area Programme — Proj
 Offr: Dr D R Purohit, Ph: 28154.

Haryana

Area: 44,212 sq km Population: 12,922,618

Capital: CHANDIGARH

Cows: 2,341,000 Buffaloes: 3,365,000

Annual Milk Production: 2,700,000 tonnes

MILK COMMISSIONER'S OFFICE, Govt of Haryana,
 Kothi No 692, Sector 6, Panchkula 134109;
 Ph: 84693.

Milk Commissr: Dr J L Bhutani, Ph: 84693
 Proj Offr: Dr Inder Prakash Arora
 Statistical Offr: Lal Singh Yadav
 Dist Dairy Dev Offrs — Ambala: Dr Gopal
 Singh; Bhiwani: Dr Kadam Singh; Faridabad:
 Dr Harish Kumar; Gurgaon: Dr Janamjit
 Singh; Hisar: Vijay Singh Sangwan; Jind:
 Dr Chander Prakash; Karnal: Asst Dir
 (Anim Prod): Dr S K Sharma, Ph: 2454;
Kurukshetra: N K Kapoor; Mohindergharh
 (Narnaul): Dr Om Prakash; Sirsa: Dr P N
 Girdhar; Sonepat: Dr Kuldeep Singh.
 Asst Dirs (Anim Production) — Karnal: Dr S
 K Sharma, Ph: 2454; Rohtak: Dr D N Dahiya,
 Ph: 2869.
 Mgr, Quality Control, Haryana State Dairy
 Laboratory, Rohtak; S P Singh, Ph: 2869.

DIRECTORATE OF ANIMAL HUSBANDRY, SCO No 80-
 81, Sector 17-C, Madhya Marg, Chandigarh
 160017; Ph: 28334, Gram: Pashupalan.
 Dir: Dr S N Sharma, Ph off: 24735,
 resi: 24165
 Jt Dir: Dr G P Grover, Ph off: 28334,
 resi: 23989
 Jt Dir: Dr P L Chadha, Ph: 28334
 Dep Dir (AH): Dr Ghansham Dass, Ph: 28334
 Dep Dir (Statistics): S L Gupta, Ph: 22726
 Dep Dir (Rinderpest & Disease Control):
 Dr V P Arora (Rohtak), Ph: 4432
 Epidemiologist: Dr V P Malik (Sonepat),
 Ph: 2001
 Estt Offr: V S Mohal, Ph: 28334
 Regl Statistical Offr: V P Bhatnagar,
 Ph: 28334
 Credit Plg Offr: Dr A N Goyal, Ph: 29110
 Asst Accounts Offr: R D Kashyap, Ph: 29110
 Gaushala Dev Offr: Dr Yashpal Chander Mehta,
 Ph: 22726

Intensive Cattle Development Projects (ICDP)
 — Dep Dirs — Ambala 134003: Dr K S Lal,
 Ph: 57225; Bhiwani 125021: Dr D D Sharma,
 Ph: 3563; Gurgaon: Dr Mukhtiar Singh
 Malik, Ph: 22115; Jind 126102: Dr O P
 Gupta, Ph: 2229; Karnal 132001: Dr Ved
 Vrat Arya, Ph: 2805; Kurukshetra: Dr R D
 Kashyap, Ph: 126; Sirsa: Dr C B Lohan,
 Ph: 21007.
 Dep Dirs (AH) — Faridabad: Dr H K Sood;
Narnaul: Dr Tek Chand Ahlawat, Ph: 221.
 Rural Development Agencies — Addl Dep
 Commissr-cum-Chief Exec Offrs — Ambala
 134001: Sajjan Singh, IAS, Ph: 56246;
Bhiwani 125021: N K Tandon, IAS, Ph: 2349;
Faridabad 121002: Ram Singh, IAS, Ph:
 3335; Gurgaon 122001: Smt Urvashi Gulati,
 IAS, Ph: 2710; Hisar 125001: Sajjan Singh,

IAS, Ph: 2692; Jind 126102: Smt Padmini Desikachar, IAS, Ph: 341; Karnal 132001: P K Choudhary, IAS, Ph: 3584; Kurukshetra 132118: Jagbir Singh, IAS, Ph: 756; Narnaul (Mohindergharh) 123001: Ajit M Sharan, IAS, Ph: 62; Rohtak 124001: N K Jain, IAS, Ph: 2589; Sirsa 125055: Samir Mathur, IAS, Ph: 3279; Sonepat 131001: S C Chaudhary, IAS, Ph: 3192.

Himachal Pradesh

Area: 55,673 sq km Population: 4,280,818

Capital: SHIMLA

Cows: 2,174,000 Buffaloes: 616,000

Annual Milk Production: 4,45,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Khallini, Shimla 171002; Ph: 3089, Gram: Himvety. Dir: Dr V L Mehta, Ph off: 3089, resi: 3561

Jt Dir (HQ): Dr R C Chaudhry, Ph: 2298

Jt Dir (Palampur Region): Dr J N Batta, Ph: 98

Dep Dir: Dr N N Wahal, Ph: 5806

Dep Dir (Dairy): L R Chauhan, Ph: 6319

Dep Dir (Statistics): Karan Singh, Ph: 5806

Dep Dir (Mandi Region): Dr P S Sen, Ph: 2260

Epidemiologist: Dr B Singh, Ph: 3277

Offr Incharge (MFAL): Dr C L Gupta, Ph: 5806

Offr Incharge (Semen Tech): Dr Dashrath

Raj, Ph: 5199

Rinderpest Offr: Dr H C Gupta

Tech Asst (HQ): Dr A B Negi, Ph: 6749

Asst Agrostologist: R S Thakur, Ph: 6749

Rural Development Agency -- Shimla (Ph:

3433); Sirmour (Ph: 181); Solan (Ph: 476).

Intensive Cattle Development Project (ICDP): Ghanchatti, Shimla; Proj Offr: Dr Dashrath Raj, Ph: 22.

Dist AH Offrs -- Bilaspur: Dr N S Gazta, Ph: 94; Chamba: Dr O P Jhanga, Ph: 117; Hamirpur: Dr D V Segal, Ph: 276; Kangra:

Vacant, Ph: 61; Kaza (Spiti): Dr H N

Chauhan; Kinnaur: Dr S D Sharma; Kullu:

Dr N J Tandon, Ph: 89; Lahaul: Dr C R

Kapoor; Mandi: Dr R P Sobti, Ph: 2463;

Pangi: Vacant; Shimla: Dr R S Parmar,

Ph: 2142; Sirmour: Dr R N Sharma, Ph:

103; Solan: Dr C D Panwar, Ph: 293; Una:

Dr Bikram Singh, Ph: 17.

Dairy Mgr, Kangra: A L Mehindru, Ph: 52.

Jammu & Kashmir

Area: 222,236 sq km Population: 5,987,389

Capital: SRINAGAR (Summer) & JAMMU (Winter)

Cows: 2,312,000

Buffaloes: 555,000

Annual Milk Production: 4,03,000 tonnes

JAMMU DIVISION

ANIMAL HUSBANDRY DEPARTMENT, Old Secretariat, Jammu 180001; Ph: 44552.

Dir: Dr D D Sharma, Ph: 44552

Jt Dir (Poul-cum-Livestock Prod): Dr J K Tikku, Ph: 43868

Tech Asst to Dir: Dr R K Gupta

Extn Centres -- Doda: Banihal, Bhaderwah, Kishtwar, Ramban; Jammu: Dansal, R S Pura, Vijaypur; Kathua: Bani, Basoli, Billawar, Hiranagar; Poonch: Mendhar, Poonch; Rajouri: Rajouri, Sunderbani; Udhampur: Chenani, Ramnagar, Reasi.

KASHMIR DIVISION

ANIMAL HUSBANDRY DEPARTMENT, Hariparbat, Srinagar 190001; Ph: 72141.

Dir: Dr I S Bakshi, Ph: 72141, resi: 75901

Tech Asst to Jt Dir: Dr J L Mattoo.

Karnataka

Area: 191,791 sq km Population: 37,135,714

Capital: BANGALORE

Cows: 10,718,000

Buffaloes: 3,610,000

Annual Milk Production: 2,000,000 tonnes

DEPARTMENT OF ANIMAL HUSBANDRY & VETERINARY SERVICES, Visveswaraiiah Centre, Mini Tower, Dr B R Ambedkar Veedhi, Bangalore 560001; Ph: 27431, Gram: Veterinary.

Dir: Dr H B Shetty, Ph off: 27431, resi: 575850

Addl Dir: Dr H T Venkata Setty, Ph off: 72882, resi: 606109

Jt Dir (Livestock Dev): Dr V V Adkoli,
Ph: 28643

Jt Dir (Anim Health): Dr N Chandrasekhara
Reddy, Ph: 72767

Jt Dir (SFDA): Dr M M Nayak, Ph (resi):
353003

Dep Dir (RPES): Dr N Rajagopal, Ph: 362693

Dep Dir (Statistics): N Nagaraja

Dev Offr (KVS): Dr S A Wali

Asst Dir (Dairy): Dr H B Venkatesh Reddy

Asst Dir (ICDS): Dr B R Chandrappa,
Ph: 360839

Asst Dir (SFDA): Dr K Bhagavan

Jt Dirs — Bangalore: Dr T Aswathanarayana,
Ph: 74331; Belgaum: Dr M S Ramathirtha-
math, Ph: 21722; Gulbarga: Dr Bheemasena
Rao Tengli, Ph: 20491; Mysore: Dr A
Kumaraswamy, Ph: 23087.

Regl Dep Dirs — Bangalore: Dr B K Mohan
Das, Ph: 74331; Belgaum: Dr C B Meti, Ph:
21722; Mysore: Dr D G Wadappi, Ph: 23087.

Dep Dirs — Bangalore (Urban): Dr P Nanda-
gopal, Ph: 360839; Bangalore (Rural):
Dr Rangaswamy; Belgaum: Dr Y H Dunda
Reddy, Ph: 24668; Bellary: Dr M M Bill-
alli, Ph: 3150; Bidar: Dr Madhukar Mady-
alkar, Ph: 578; Bijapur: Dr V B Virakta-
math, Ph: 1028; Chikmagalur: Dr S P Par-
swanathaiah, Ph: 8927; Chitradurga: Dr V
S Mirji, Ph: 2719; Coorg (Madikeri): Dr
R S Chikka Reddy, Ph: 339; Dharwad: Dr N
M Kulkarni, Ph: 8743; Gulbarga: Dr Nara-
yana Rao Yergolkar, Ph: 1357; Hassan:
Dr H Devappanaik, Ph: 8033; Karwar: Dr S
N Vaidya, Ph: 467; Kolar: Dr R Mahadev-
appa, Ph: 297; Mandya: Dr B Radhakrishna,
Ph: 461; Mangalore: Dr R R Kamath, Ph:
22020; Mysore: Dr L Shanthakumar, Ph:
30606; Raichur: Dr S M Lokanath, Ph: 8520;
Shimoga: Dr H M Kulkarni, Ph: 2676; Tum-
kur: Dr B S Ramu, Ph: 8616.

Key Vill. Centres — Ajjampur (Chikmagalur
Dist), Aland, Ammathi (Madikeri Dist),
Bidar, Bijapur, Chamarajanagar, Channa-
rayapatna (Hassan Dist), Chintamani,
Davangere (Chitradurga Dist), Gonikoppal
(Madikeri Dist), Gulbarga, Harappana-
halli, Haveri (Dharwad Dist), Hesser-
ghatta, Hirekerur (Dharwad Dist), Hospet,
Hudgi (Bidar Dist), Hukkeri, Hunsur, Jam-
khandi (Bijapur Dist), Kanakapura, Kinni-
goli, Kollegal (Mysore Dist), Kunigal,
Malavalli (Mandya Dist), Mulbagal, Sin-
dhanur (Raichur Dist), Sirsi (Karwar
Dist), Somwarpet (Madikeri Dist), T
Narsipura.

AI Centres — Gokak, Mangalore, Shimoga.

Regl Laboratories (AI Centres) — Anekal,
Bangarpet, Bankapura, Byrapatna, Dodda-
ballapur, Kalghatgi, Kittur, Navalgundi.

Kerala

Area: 38,863 sq km Population: 25,453,680

Capital: TRIVANDRUM

Cows: 3,097,000

Buffaloes: 409,000

Annual Milk Production: 1,345,000 tonnes

DIRECTORATE OF DAIRY DEVELOPMENT, Pattom,
Trivandrum 695004; Ph: 75814.

Dir: P G Ramachandran Pillai, Ph off: 75749,
resi: 8161

Jt Dirs: E H Nathan, N Appukuttan Nair,
Ph: 75799

Dep Dir (Livestock): E A Paul

Dep Dir (General): K Chellappan

Dep Dir (Extn): K Radhakrishnan

Asst Dirs — Alleppey: M K Govinda Panicker,
Ph: 3958; Cannanore: S Jayakumar, Ph:
3659; Ernakulam: P M Devassia, Ph: 856710;
Idukki: K Gopalakrishnan Nair; Kottayam:
C C Michael, Ph: 2768; Kozhikode: N T
Sivadasan; Malappuram: P P Abdullakutty,
Ph: 244; Palghat: P Anand, Ph: 3937;
Patharamthitta: Mathew P Chandy; Quilon:
R Ayyappan Pillai, Ph: 76827; Trichur: M
Sathyapalan, Ph: 20954; Trivandrum: M K
Thomas, Ph: 8406; Wynad: T M Mathew, Ph: 307.

Quality Control Officers — Alleppey: G
Raveendran Nair; Ernakulam: George Sen;
Kozhikode: Tony Michael; Malappuram: R
Balasubramaniam; Quilon: V R Krishnan;
Trivandrum: S Sivasankaran Nair.

DIRECTORATE OF ANIMAL HUSBANDRY, Vikas Bha-
van, PB No 5405, Trivandrum 695035; Ph:
62283, Gram: Keralavet.

Dir: Dr K Thankaraj,
Ph off: 62283

Addl Dir (AH): Dr P Govindan Kutty, Ph off:
62683, resi: 76510

Addl Dir (SLPP): Dr P Natarajan, Ph: 77610

Addl Dir (Extn): Dr A Sethumadhavan,
Ph: 62918

Jt Dir (Livestock Prod): Dr N Sasidharan,
Ph: 62683

Jt Dir (AH): Dr A Vaidyanatha Iyer,
Ph: 60683

Jt Dir (SLPP): Dr C P Gomez, Ph: 77610
 Jt Dir (Statistics): Dr P Janardhana Menon, Ph: 60683
 Dep Dirs (SLPP): Dr P K Mathukutty, Dr M Meeran Kunju, Ph: 77610
 Dep Dir (Extn): Dr M O Thomas, Ph: 62683
 Dep Dir (KV): Dr Edward Samuel, Ph: 62683
 Asst-Dir (CD): Dr M V Chacko, Ph: 62683
 Principal, Livestock Mgmt Trg Centre: Dr A Sethumadhavan, Ph: 62918
 Dep Dir (DRDA, Trivandrum): Dr P Gopikuttan Nair, Ph: 76567
 Dep Dir (Cannanore Region): Dr P P Krishna Iyer
 Dep Dir (Training, Alwaye): Dr K Rajagopalan Nair
 Chief Disease Investigation Offr, Palode: Dr M R Murugan
 Advisor (AH to Govt of Kerala): Dr P K Nambiar, Ph off: 74942, resi: 82115
 Dist AH Offrs -- Alleppey: Dr E C Francis, Ph: 2431; Calicut: Dr K C Chacko, Ph: 72905; Cannanore: Dr M Chandrahasan, Ph: 4367; Ernakulam: Dr K A Sivadas, Ph: 360648; Idukki: Dr K J Mathai, Ph: 2894; Kasargod: Dr T K D Patnair; Kottayam: Dr K Sukumaran, Ph: 3726; Malappuram: Dr K P Kesavan Nair, Ph: 217; Palghat: Dr M S Jayasooryan, Ph: 3307; Pathanamthitta: Dr K Madhusoodanan Pillai, Ph: 762; Quilon: Dr N Madhavan Nair, Ph: 3565; Trichur: Dr P Natarajan, Ph: 23216; Trivandrum: Dr K V Balachandran Nair, Ph: 75496; Wynadu: Dr P Viswambaran Unnithan, Ph: 292.
 Intensive Cattle Development Projects (ICDP) -- Proj Offrs -- Alwaye: Dr E C Francis, Ph: 4441; Calicut: Dr E P Muraleedharan, Ph: 73949; Cannanore: Dr K K Govindan Nambiar; Kottarakkara: Dr S Narayana Pillai; Palghat: Dr V P Sreedharan, Ph: 4858; Trivandrum: Dr M Mohammed Ibrahim.
 AI Centres -- Alleppey Dist: Alleppey, Ambalapuzha, Mallapally, Pullad, Sherthallai; Calicut Dist: Kozhualoor, Panthallayani, Tellicherry; Cannanore Dist: Kasargod, Manjeswar; Ernakulam Dist: Chennamangalem, Kottavally, North Parur; Idukki Dist: Chakayallam; Malappuram Dist: Changaramkulam, Perinthalmanna, Thirur; Palghat Dist: Kanjirapuzha, Vaniamkulam; Quilon Dist: Elanthur; Trichur Dist: Kodungallur, Kunnamkulam, Mala, Pazhayannur, Vaniampara.

Lakshadweep

Area: 32 sq km

Population: 40,249

Capital: KAVARATTI

Cows: 3,000

Buffaloes: Below 500

Annual Milk Production: 850 tonnes

DEPARTMENT OF ANIMAL HUSBANDRY, Kavaratti 673555.

Asst Dir (AH): Dr P O Joseph, Ph off: 368, resi: 293.

Madhya Pradesh

Area: 443,446 sq km Population: 52,178,844

Capital: BHOPAL

Cows: 26,982,000

Buffaloes: 6,415,000

Annual Milk Production: 3,069,000 tonnes

DIRECTORATE OF VETERINARY SERVICES, Tulsi Nagar, Bhopal 462005; Ph: 61152, Gram: Pashudhan.

Dir: Dr P R Sharma, Ph off: 61680, resi: 61007

Addl Dir: Dr B A Venkataramu, Ph off: 68347, resi: 61540

Jt Dir (Vet): Dr A P Shukla, Ph off: 61764, resi: 62229

Jt Dir (Key Vill): Dr M M Tatte, Ph off: 61778, resi: 68412

Jt Dir (SFAP): Dr P D Limaye, Ph off: 61882, resi: 63017

Jt Dir (Farms): Dr P R Untewale, Ph off: 61882, resi: 61254

Jt Dir (Stat): Sarangapani, Ph off: 66002

Jt Dir (Bpl Div): Dr D K Chakravarty, Ph off: 61028

Dep Dir (HQ): Dr R N Saxena

Dep Dir (Plan): Dr A N Kher, Ph off: 61778

Dep Dir (Mark Farm): Dr P T Pathak

Dep Dir (Key Vill): Dr P N Bhatnagar, Ph off: 61778, resi: 61288

Dep Dir (SFAP): Dr L P Tiwari, Ph resi: 61297

Dep Dir (Poultry): Dr W B Pandey

Dep Dir (Surveyance): Dr A S Khan

Dist Vet Offrs -- Ambikapur: Dr M H Khan;

Balaghat: Dr V K Dubey, Ph: 286; Betul: Dr V C Verma, Ph: 94; Bhind: Dr H P Soni; Bhopal: Dr S N Shrivastava, Ph: 64812; Bilaspur: Vacant, Ph: 4464; Chattarpur: Dr R B Shrivastava; Chindwara: Dr C M Saharey, Ph: 297; Damoh: Vacant; Datia: Dr S K Sood; Dewas: Dr M V Bhale, Ph: 255; Dhar: Dr W R Kharche, Ph: 186; Durg: Dr Chickhlikar, Ph: 746; Guna: Dr S R Yadav; Gwalior: Dr U C Shukla; Hoshangabad: Dr J L Verma, Ph: 378; Indore: Dr M S Pandit, Ph: 39953; Jabalpur: Dr M P Choubey, Ph: 20141; Jagdalpur: Vacant; Jhabua: Dr M N Siddique; Khandwa: Dr P P Dhabherey, Ph: 2136; Khargone: Dr P S Jhat; Mandla: Dr P N Dubey; Mandsour: Dr L N Lal, Ph: 694; Morena: Dr S P Singh; Narsinghpur: Dr P K Khare; Panna: Dr Shrikant Nigam; Raigarh: Dr S C Suri; Raipur: Dr D G Sutone, Ph: 23148; Raisen: Dr R K Gorakh, Ph: 31; Rajgarh: Dr R A Pattan; Rajnandgaon: Dr P E Salpekar; Ratlam: Dr H J Vyahare; Rewa: Dr M P S Parihar; Sagar: Dr B S Shrivastava, Ph: 2805; Satna: Dr R N Singh; Sehore: Dr Gopal Das, Ph: 406; Seoni: Dr S K Shrivastava, Ph: 485; Shahdol: Dr S S Gaharwar; Shajapur: Dr S K Gondal, Ph: 732; Shivpuri: Dr M S Sangar; Sidhi: Dr Y S Chouhan; Tikamgarh: Dr R B Lal Shrivastava, Ph: 114; Ujjain: Dr V S Patil, Ph: 1181; Vidisha: Dr J A Qureshi, Ph: 573.

Key Vill Centres — Betul; Bhanupratappur, Bastar Dist; Burhanpur, Khandwa Dist; Damoh; Datia; Dhamtari, Raipur Dist; Durg; Katni, Jabalpur Dist; Kesla, Hoshangabad Dist; Lakhnadou, Seoni Dist; Mandla; Mandsour; Naugaom, Chhatarpur Dist; Panna; Ratlam; Shivpur; Sidhi; Singrauli, Sidhi Dist.

Intensive Cattle Development Projects(ICDP) — Bhind, Bhopal, Bilaspur, Indore, Jabalpur, Jagdalpur, Narsinghpur, Raipur, Rewa, Sagar, Shahdol, Tikamgarh.

AI Centres — Agar, Ajaygarh, Ashta, Bhopal, Dabra, Dongargarh, Guna, Gwalior, Hoshangabad, Imlikheda, Khandwa, Morena, Narayangarh, Raigarh, Rajnandgaon, Seg-aon, Sehore, Sonkatch, Waraseoni.

Improved Dairy Cattle Production Projects — Chhindwara, Guna, Jhabua, Raigarh, Sarguja, Sidhi.

DAIRY DEVELOPMENT DEPARTMENT, Government of Madhya Pradesh, Jhangirabad, Bhopal 462008; Milk Commissr: J K Sharma, IAS.

Maharashtra

Area: 307,690 sq km Population: 62,784,171

Capital: BOMBAY

Cows: 15,937,000 Buffaloes: 3,958,000

Annual Milk Production: 2,533,000 tonnes

OFFICE OF THE DAIRY DEVELOPMENT COMMISSIONER, Maharashtra State, New Administrative Bldg, Abdul Gafarkhan Rd, Worli Seaface, Bombay 400018; Ph: 4937087, 4935929, Gram: Dairy Dev Com.

Dairy Dev Commissr: Navin Kumar, IAS, Ph off: 4931571, resi: 2025930

Addl Dairy Dev Commissr: N N Patil, Ph off: 4937010, resi: 8281803

Dep Dairy Dev Commissr (P&D): S K Tinaikar, Ph off: 4937064/87, resi: 8125781

Dep Dairy Dev Commissr (P&P): R J Nerurkar, Ph off: 4937064/87, resi: 687209

Dep Dairy Dev Commissr & Financial Adviser: A D Dharap, Ph off: 4937064/87, resi: 507221

Dep Dairy Dev Commissr (Admn): G N Malusare, Ph off: 4937064/87, resi: 4949783

Dep Dairy Dev Commissr & Supdt Engr-I: S E Sawant — Wakefield House, Ballard Estate, Bombay 400001; Ph off: 264293, resi: 539027

Dep Dairy Dev Commissr & Supdt Engr-II: S P Patil — c/o Govt Milk Scheme, near Maryayi Gate Police Station, Pune 411003; Ph off: 54564, resi: 53721

Jt Registrar Coop Societies (Dairy): H M Gajbhiye, Ph off: 4937064/87

Dep Dairy Engineer: P B Pawar, Ph (resi): 4920485

Public Relations Offr: S P Khedekar, Ph off: 4937208, resi: 6424569

Greater Bombay Milk Scheme, Worli Seaface, Worli, Bombay 400018; Gen Mgr: N D Kotnis, Ph off: 4937179, resi: 6343540; I/c Dairy Mgr: M J Daniel, Ph off: 4937378, resi: 4931589; Controller (Milk Proc & Distribution): M M Limaye, Ph off: 4938220, resi: 4922358; Controller (Milk Transport Services): S R Kotnis, Ph off: 4934316, resi: 4920293.

Mother Dairy, Kurla — Dairy Mgr (I/c): S B Kher, Ph off: 524330, resi: 683441.

Central Dairy, Aarey — Dairy Mgr: Vacant, Ph off: 692211, 684705

Chief Exec Offr, Aarey: K B Patil, Ph off: 692211, resi: 611495

Controller of Cattle: P H Inamdar,
Ph off: 692528, resi: 4940141 (Cattle
Market, Goregaon, Bombay 400063).

Proj Offr, Dairy Proj (Dapchhari): A R
Karve, Ph off: 40, resi: Ext 10.

Regl Dairy Dev Offices -- Amravati: Govt
Milk Scheme Compound, Congress Nagar,
-444666; Ph: 2676; Regl Dairy Dev Offr:
B S Naphade, Ph (resi): 3047; Aurangabad:
Administrative Bldg, Govt Milk Scheme
Compound, Jalna Rd; Ph: 3971; Regl Dairy
Dev Offr: G H Attarde, Ph (resi): 3972;
Nagpur: Lal Bungalow, Near GPO, -440001;
Ph: 34792, 32960, resi: 22939; Regl Dairy Dev
Offr: S S Joshi; Nasik: Govt Milk Scheme
Compound, Trimbak Rd, -422002; Ph: 73023;
Regl Dairy Dev Offr: G S Girme, Ph
(resi): 77291; New Bombay: Konkan Bhavan,
5th Floor, Vashi, -400614; Ph: 682411,
681486; Regl Dairy Dev Offr: P B Pawar, Ph
(resi): 5550050; Pune: Common Wealth Bldg,
Laxmi Rd, -411030; Ph: 440566; Regl Dairy
Dev Offr: V M Waghmare, Ph (resi): 52980.

Dist Dairy Dev Offices (DDDOs) -- Ahmednagar:
Hirabai Jain Dharamshala, Christ
Lane; Ph: 3639; DDDO: V B Vaidya; Akola:
Govt Milk Scheme Compound, Murtijapur
Road; Phone: 6025; DDDO: M N Phohan-
kar; Amravati: c/o Govt Milk Scheme, 53
Congress Nagar; Ph: 4958; DDDO: D V
Shobhane; Aurangabad: c/o Govt Milk
Scheme, Kranti Chowk, Jalna Rd; Ph: 4645;
DDDO: B M Kulkarni; Beed: Govt Milk
Scheme Compound, Barshi Nakahod; Ph: 440;
DDDO: V D Kulkarni, Ph (resi): 429;
Bhandara: Shanti Niwas, Mohane Bhavan,
Station Rd, -411904; Ph: 657; DDDO (I/c):
R S Raut; Bombay: Konkan Bhavan, 5th Floor,
Vashi, -400614; Ph: 681362; DDDO: Smt A D
Shelatkar; Buldhana: c/o Ashok Vihar,
Near Bus Stand; Ph: 262; DDDO: A V Umal-
kar; Chandrapur: Vairagade Bldg, Ram-
nagar; Ph: 3226; DDDO: S K Jangam; Dhule:
c/o Govt Milk Scheme, Chakkar Bardi Rd,
-424001; Ph: 1924; DDDO: V B Bhangale;
Gadchiroli: Administrative Bldg, Barrack
No 4; Ph: 178; DDDO: K P Rajput; Jalgaon:
c/o Jalgaon Dist Coop Milk Producers'
Union, PB No 32, -425001; Ph: 5405; DDDO:
P A Salunkhe; Jalna: No 3-6, 100 Kacheri
Rd, Old Jalna; Ph: 3134; DDDO: P B Aade;
Kolhapur: c/o Govt Milk Scheme, Central
Dairy, Tarabai Park; Ph: 28724; DDDO:
L G Phadtare; Koliwada: Alibag (Karve
Bldg), Anirudre Smriti, -402201, Dist
Raigad; Ph: 283; DDDO: G N Chitale;
Kudal: c/o Bhogate Engg Works, MIDC Rd;
Ph: 254; DDDO: S M Patole; Latur:

Near Collector House, Bank Colony; Ph:
2972; DDDO: J C Yaydande; Miraj: c/o
Gen Mgr, Govt Milk Scheme; Ph: 2837;
DDDO (I/c): A D Shringare; Nagpur: Bokil
Niwas, Behind Laxmi Talkies, Sita Baldi,
-440012; Ph: 23731; DDDO: A D Dhamane;
Nanded: Pankaj Mansion, 2nd Floor, Opp
Bedik College, Bazirabaddar Rd, -431601;
Ph: 3619; DDDO: N N Thipse; Nasik: Guru-
kripa Bldg, 3rd Floor, -422002; Ph: 76250;
DDDO: P K Ghatmale; Osmanabad: Govt Milk
Chilling Centre Premises, Tulajapur Rd;
Ph: 463; DDDO: A N Kshirsagar, Ph (resi):
483; Parbhani: c/o Govt Milk Scheme,
Shivaji College Compound, -413411; Ph:
252; DDDO: D V Gosavi; Pune: c/o Govt
Milk Scheme, Near Maryayi Gate Police
Station, -411003; Ph: 52890; DDDO: K D Shah;
Ratnagiri: 571-1 Khatib Coop Socy, Thiwa
Palace Rd, -425612; Ph: 29823; DDDO (I/c):
N D Sawant; Satara: 329 Yadav Gopal Seth,
Near Chitra Cinema; Ph: 3146; DDDO: A D
Deshpande; Solapur: c/o Govt Milk Scheme,
Vajipur Rd, Near Dak Bungalow, -413003;
Ph: 6847; DDDO: D M Gharal; Wardha: Near
Gadge Baba Temple, Bachelor Rd, -442001;
Ph: 2897; DDDO: G B Zade; Yeotmal: Saras-
wat Bldg, Journalist Colony, -445001; Ph:
2032; DDDO: A G Gokhale.

DIRECTORATE OF ANIMAL HUSBANDRY, Central
Bldg, Pune 411001; Ph: 62381, 62382,
64872, Gram: Veterinary.

Dir: Dr P D Mokasdar, Ph off: 63843,
resi: 64331

Jt Dir (HQ): Vacant

Jt Dir (SLPP): Dr V D Huilgol, Ph: 59321

Jt Dir (Disease Investigation Section):

Dr D S Thakur, Ph: 58474, 51421

Dep Dir (Personnel): Dr V K Limaye

Dep Dir (Livestock): Dr K P Puranik

Dep Dir (Fodder): C P Meshram, Ph: 59321

Dep Dir (Planning): Dr D D Sane

Dep Dir (Disease Control): Dr N M Jangnure

Dep Dir (Extn): Dr R K Khandekar, Ph: 59321

Dep Dir (SLPP): Dr K M Rahatkar, Ph: 59321

Dep Dir (Dip Inservice Trg): Dr M B Tatke,
Ph: 59034

Dep Dir (Frozen Semen Lab): Dr R S Kulkarni,
Ph: 55271

Dep Dir (AI): Dr K N Kulkarni, Ph: 55271

Dep Dir (Statistics): V D Shirke, Ph: 55271

Dep Dir (Poultry & Piggery): Dr N R Kyadi-
guppi, Ph: 62381/82, resi: 4447

Dep Dir (Frozen Semen), Nagpur: Dr M V Nisal

Dep Dir (Fodder), Amravati: S T Donde

Dep Dir (Tribal Scheme), Nasik: Dr G R Ayyar

Dep Dir (DPAP), Ahmednagar: Dr S V Shembekar
 Asst Dirs of AH — Livestock: Vacant; AI:
 Vacant; Disease Control: Dr S A Kharde;
 Planning: Dr P D Dixit; Tribal Schemes:
 Dr B V Soman; Training: Dr P Y Washikar;
 Sire Evaluation: Dr P P Ponkshe; Milk
 Competition: Dr V N Jahagirdar; Extension:
 Dr L D Gholap; SLPP: Dr G R Potnis,
 Ph: 59321; Statistics: R B Patil, Ph:
 57045; Statistics Int Survey Scheme: Dr
 T P Mali, Ph: 57045; IRDP: Dr M G Kul-
 karni, Ph: 59321; Animal Census: Sara-
 laskar, Ph: 57045.

Regl Jt Dirs of AH — Amravati: Dr C M Sas-
 takar; Aurangabad: Dr K L Kulkarni, Ph:
 4953, resi: 4380; Nagpur: Dr S G Manwat-
 kar; Nasik: Dr P G Sohoni, Ph: 73541,
 77015, resi: 77048.

Dep Dirs of AH, Aarey Milk Colony, Goregaon,
 Bombay 400065; Ph: 685103 — Quality Con-
 trol: Dr J A Bapat; Microbiologist: Dr V
 T Sardeshpande; Anim Nutrition: Dr D M
 Khare.

Dist Dep Dirs of AH & Asst Dirs of AH —
Ahmednagar: Dr D D Newasker & Dr S V
 Kukade, Ph: 3617; Akola: Dr R D Agni-
 hotri & Dr M Z Khan, Ph: 4954; Amravati:
 Dr M J Deshmukh & Dr G N Gore, Ph: 4526;
Aurangabad: Dr M S Surudkar & Dr S B
 Shinde, Ph: 3192; Beed: Vacant & Dr M S
 Ahmed, Ph: 392; Bhandara: Dr P E Pawar &
 Dr A T Dani, Ph: 413; Buldhana: Dr H M
 Sawarkar & Vacant, Ph: 306; Chandrapur:
 Dr M G Nakade & Dr D D Bawne, Ph: 3320;
Dhule: Dr J L Mahajan & Dr P B Chinawal-
 kar, Ph: 652; Gadchiroli: Dr M R Andhare
 & Dr B N Bidwai, Ph: 161; Jalgaon: Dr S
 P Deshpande & Dr R S Navkhede, Ph: 5550;
Jalna: Dr R S Deshpande & Vacant, Ph:
 3106; Kolhapur: Dr S D Sapre & Dr V S
 Kulkarni, Ph: 26543; Latur: Dr M G Sab-
 nis & Dr M R Pachegaonkar, Ph: 2529, 2873;
Nagpur: Dr A G Deshpande & Dr D B Ayde,
 Ph: 23074; Nanded: Dr M S Deshmukh & Dr
 S V Ringe, Ph: 3367; Nasik: Dr K B Apte
 & Vacant, Ph: 73541, 77015; Osmanabad:
 Dr M H Kulkarni & Dr B A Vaidya, Ph: 205;
Parbhani: Dr V R More & Dr N L Pawar,
 Ph: 388; Pune: Dr P M Deshpande & Dr A N
 Sathe, Ph: 59312; Raigad (HQ at Pen):
 Dr R N Khapre & Dr D L Shivalkar, Ph:
 359; Ratnagiri (HQ at Chiplun): Dr R B
 Namdas & Dr S N Deshmukh, Ph: 107; Sangli
 (HQ at Miraj): Dr A D Godbole & Dr V V
 Kulkarni, Ph: 2508; Satara: Dr M M Sathe
 & Dr V A Bhave, Ph: 2329; Sholapur: Vacant
 & Dr S B Andurkar, Ph: 4960; Sindhudurg:
 Dr L N Kulkarni & Dr G V Sane, Ph: 140;

Thane (HQ at Mulund, Bombay): Vacant &
 Dr D V Samant, Ph: 5601809; Wardha: Dr
 R G Radke & Dr P R Pullarwar, Ph: 2967;
Yeotmal: Dr M D Pande & Dr B L Kale, Ph: 2233.
 Dist AH Offrs (Zila Parishads) — Ahmed-
nagar: Dr B D Unhale, Ph: 3696; Akola:
 Dr P H Kadam, Ph: 4865; Amravati: Dr P G
 Deshmukh, Ph: 4066; Aurangabad: Dr R A
 Deshpande, Ph: 5571; Beed: Dr M K Kalme,
 Ph: 392; Bhandara: Dr S B Amin, Ph: 326/
 574; Bombay: Dr R P Nene, Ph: 685103;
Buldhana: Dr S S Bhagade, Ph: 438; Chan-
drapur: Dr A S Khati, Ph off: 2240, resi:
 2206; Dhule: Dr I C Patil, Ph off: 514,
 resi: 2469; Gadchiroli: Dr S A Panditrao,
 Ph: 145; Jalgaon: Dr H B Patil, Ph: 3889;
Jalna: Dr M B Dharmadhikari, Ph: 311
 Ext 2; Kolhapur: Dr G K Joshi, Ph: 25045;
Latur: Dr S G Kadam, Ph: 2834; Nagpur:
 Dr A S Kuchewar, Ph: 31150; Nanded: Dr S
 H Hayatnagar, Ph: 3232; Nasik: Dr A V
 Phadke, Ph: 72648; Osmanabad: Dr S N
 Choudhari, Ph off: 318, resi: 325; Par-
bhani: Dr S Y Mane, Ph: 163; Pune: Dr L
 S Wani, Ph: 20799; Raigad: Dr C B Panse,
 Ph: 48; Ratnagiri: Dr P Y Kulkarni, Ph:
 2298; Sangli: Dr P V Kulkarni, Ph: 2711,
 resi: 4763; Satara: Dr N V Tandale, Ph:
 2861; Sholapur: Dr B P Kulkarni, Ph: 3593;
Sindhudurg: Dr R G Shriodkar, Ph: 194;
Thane: Dr S R Deshpande, Ph: 508151;
Wardha: Dr D K Daphalapurkar, Ph: 2308;
Yeotmal: Dr Y M Bhadanga, Ph: 2203.

AI Centres — 2,836 spread out in the state
 including 1,637 which have got frozen
 semen facilities.

Manipur

Area: 22,327 sq km Population: 1,420,953

Capital: IMPHAL

Cows: 747,000

Buffaloes: 138,000

Annual Milk Production: 72,000 tonnes

DIRECTORATE OF VETERINARY & ANIMAL HUSBANDRY,
 Near Sanjenthong, Imphal 795001; Ph:
 20224, Gram: Vetmanipur.

Dir: Dr N Tombi Singh, Ph off: 20224,
 resi: 20868

Jt Dir (AH): Dr D Vaiphei, Ph: 21521

Jt Dir (AP): Dr K Hilckham, Ph off: 20368,
 resi: 5451

Dep Dir (Plg): Dr H Bigyananda Singh,
Ph: 21507
Dep Dir (SLPP): Dr Ch Kunjakishore Singh,
Ph: 20257
Dep Dir (Admn): Dr C Mani Singh, Ph: 20386
Offr cn Spl Duty (Dairy): Dr H Gourakumar
Singh, Ph: 20963
Proj Offr (ICDP): Dr Kh Yumjao Singh,
Ph: 22004
Cattle Dev Offr: Jeevan Singh
Dist Vet Offrs — Eishnupur: Dr M Rajendra
Singh; Chandel: Dr N Dhiren Singh, Ph:
34; Churachandpur: Dr S Babutombi Sharma,
Ph: 47; Imphal: Dr S Joykumar Singh;
Senapati: Dr P Bheirup Singh; Tamenglong:
Dr Th Gune Singh; Thoubal: Dr S Biran-
mangol Singh; Ukhrul: Dr K Amusana.

Meghalaya

Area: 22,429 sq km Population: 1,335,819

Capital: SHILLONG

Cows: 550,000 Buffaloes: 29,000

Annual Milk Production: 67,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY & VETERINARY DEPARTMENT, Addl Bldg, Civil Secretariat, Shillong 793001; Ph: PBX 4201, Gram: Meghvet.

Dir: Dr A Hazarika, Ph off: 4201
Ext 320

Dep Dir (CD): Dr N Haque, Ph: 265 & 26615
Dep Dir (SAHP): Dr A A Hazarika, Ph: 23588
Head of Statistics Cell: T Marbaniang,
Ph: 265

Spl AH Programme — Offr Incharge: Dr A A Hazarika, Ph: 23588

Dist AH Offrs — Garo Hills: Tura; Ph: 48,
Gram: Disvet; Dr B K Marak; Jaintia Hills: Jowai; Ph: 311, Gram: Disvet;
Dr P Supahi; Khasi Hills: Shillong; Ph: 4724, Gram: Disvet; Dr W Bathew; West Khasi Hills: Nongstoin 793119; Ph: 27;
Dr H N Chaueng; Williamnagar: Ph: 36;
Dr S B Das.

Intensive Cattle Development Project (ICDP)
— Tura: Ph: 276; Upper Shillong: Ph: 26615, 4106.

Key Vill Centres — Jowai; Garo Hills.

Mizoram

Area: 21,081 sq km Population: 493,757

Capital: AIZAWL

Cows: 48,000 Buffaloes: 4,000

Annual Milk Production: 7,600 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY & VETERINARY, Aizawl 796001; Ph: 451, Gram: Veterinary.

Dir: Dr R Kapthuama, Ph: 451, resi: 468

Jt Dir: Dr Zokhuma, Ph: 788

Dep Dir: Dr R Zolawma

Asst Dir: Dr P C Chetia

Gen Mgr: Dr C Lianmawia (Selesih)

Information Offr: Dr L Siamliana

Disease Investigation Offr: Dr L S Hrahssel

Dist Vet Offrs — Aizawl: Dr Thanzuala;

Lunglei: Dr V Liansanga; Saiha: Dr Lalhuma.

Proj Offr, Thenzawl: Dr B C Thanthuama

Asst Disease Investigation Offr: Dr B S Prasad

Sub Divl Vet Offrs: Dr Saingura Sailo,
Dr Biakmawia.

Nagaland

Area: 16,579 sq km Population: 774,930

Capital: KOHIMA

Cows: 151,000 Buffaloes: 9,000

Annual Milk Production: 4,500 tonnes

DIRECTORATE OF VETERINARY & ANIMAL HUSBANDRY, Kohima 797001; Ph: 494, Gram: Veterinary.

Dir: Dr Satuo Sekhose, Ph off: 780, resi: 783

Jt Dir (Admn): Dr T Odyuo Lotha, Ph off: 704, resi: 576

Jt Dir (Dev): Dr T Zeliang, Ph off: 2211, resi: 763

Dep Dir (Plg): Dr L Sorhie, Ph off: 529

Dep Dir (DI): Dr S Kemp

Dep Dir (Health): Dr Joseph Keppen

Dep Dir (SLPP): Dr R D N Singh

Dep Dir (Res): Dr M K Das

Dep Dir (ICDP): Dr Hekha

Dep Dir (KV): Dr Odangmetong Ao

Dep Dir (Dairy): I Temjen

Asst Dir (Extn): Dr Jamio
 Dep Dir (Dev & Mktg), Dimapur: Dr Tajen,
 Ph: 2685.
 Dep Dir (SLPP) Offices — Dimapur, Kohima,
 Mokokchung, Mon, Phek, Tuensang, Wokha,
 Zunheboto.
 Res Offr (Statistics): K Mao.
 Dist Vet Offices — Kohima: Dr Akum; Mokok-
chung: Dr I T Jamir; Mon: Dr Senlikaba;
Phek: Dr K Phesao; Tuensang: Dr Moaliba;
Wokha: Dr P N Jamir; Zunheboto: Dr S Sema.

Orissa

Area: 155,707 sq km Population: 26,370,271

Capital: BHUBANESWAR

Cows: 12,930,000 Buffaloes: 1,333,000

Annual Milk Production: 3,46,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, DAIRY &
 VETERINARY SERVICES, Mangalabag, PB No
 44, Cuttack 753001; Ph: 21929, Gram:
 Diravet.
 Dir: Dr J N Mohanty, Ph off: 21929,
 resi: 22705
 Jt Dir (Extn): Dr N R Mishra, Ph off: 24317,
 resi: 23455
 Dep Dir (Cattle Dev): Dr P K Harichandan,
 Ph off: 23170, resi: 23710
 Dep Dir (Dairy Dev): Dr N Patro, Ph: 23760
 Dep Dir (I/c AI): Dr L D Mohanty, Ph: 24317
 Dep Dir (Plg): Dr R N Das, Ph: 23654
 Dep Dir (AN): Dr G P Mohanty, Ph off: 22296,
 resi: 22689
 Spl Offr (Plg): Dr H L Parida, Ph: 23654
 Vet Infc Offr: Dr S Mishra, Ph: 24317
 Statistician (I/c): Dr M M Patnaik,
 Ph: 24939
 Chief Dist AH & Vet Offrs — Balasore: Dr
 B R Sharkhel, Ph: 219; Baripada (Mayur-
 bhanja): Dr N C Das, Ph: 128; Bolangir:
 Dr N G Bisoi, Ph: 141; Cuttack: Dr D B
 Mishra, Ph: 22955; Dhenkanal: Dr S N
 Das, Ph: 65; Ganjam (Berhampur): Dr R C
 Das, Ph: 2397; Kalahandi (Bhawanipatna):
 Dr B Behera, Ph: 59; Keonjhar: Dr Roy,
 Ph: 4; Koraput: Dr G B Rao, Ph: 19; Phul-
bani: Dr A Behera, Ph: 31; Puri: Dr P K
 Patnaik, Ph: 9; Sambalpur: Dr A R Gupta,
 Ph: 372; Sundergarh: Dr S K Roy, Ph: 9.
 Intensive Cattle Development Projects (ICDP)
 — Cattle Dev Offrs — Berhampur (Dist

Ganjam): Dr K Sahu, Ph: 2359; Cuttack:
 Dr H K Mohapatra, Ph: 24058; Jeypore:
 Dr D K M Achari, Ph: 396; Sambalpur:
 Dr M Pradhan, Ph off: 985, resi: 1122.
 Special Livestock Development Programme —
 Proj Offrs — Cuttack: Dr A B Mishra,
 Ph: 21475; Dhenkanal: Dr S N Das (ADVC
 I/c), Ph: 203; Puri: Dr P K Patnaik
 (CDVO I/c), Ph: 473; Sambalpur: Dr A R
 Gupta (CDVO I/c), Ph: 16C.

Pondicherry

Area: 492 sq km Population: 604,471

Capital: PONDICHERY

Cows: 93,000 Buffaloes: 9,000

Annual Milk Production: 19,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Pondicherry
 605001; Ph: 7028, 6135.
 Dir: Dr K Raghunathan, Ph off: 7028,
 resi: 6196
 Addl Dir (SLPP): Dr R R Unnithan, Ph: 6135
 Dep Dir (FSB): Dr Jacob Chaacko, Ph: 6135
 Dep Dir (CD): Dr N Karthikeyan, Ph: 7028
 Dep Dir (I/c Info & Pub): Dr Alfred Gnanou,
 Ph: 6135
 Dep Dir (Eco & Stats): A R Albert
 Proj Offr (SAHP): Dr E J Raymond
 Proj Offr (DHDA): Dr T P Seetharaman,
 Ph: 6336
 Dairy Dev Offr: Dr J Muthuvaradhan, Ph: 5097
 Regl Office — Karaikal: Dep Dir (R):
 Dr Dominic Savio Jegam (I/c), Ph: 221.
 Key Vill Centres — Karaikal & Pondicherry.

Punjab

Area: 50,362 sq km Population: 16,788,915

Capital: CHANDIGARH

Cows: 3,312,000 Buffaloes: 4,110,000

Annual Milk Production: 4,250,000 tonnes

DAIRY DEVELOPMENT DEPARTMENT, Show Room No
 7-A, Sector 7-C, Madhya Marg, Chandigarh
 160019; Ph: 23228.

Milk Commissr: B M Mahajan, Ph off: 23228,
resi: 21978

Dairy Extn Offices (DEOs) -- Amritsar:
Kothi No 49, Rani Ka Bagh; Bhatinda:
Power House Rd, Kothi S Gurdial Singh
DSP (retd); Faridkot: Chakiwali Gali,
Harindra Nagar; Ferozpur: Dashmesh
Nagar, Basti Gobind Nagri; Gurdaspur:
Civil Lines Rd; Hoshiarpur: SCF, Com-
plex No 2, Session Chowk; Jalandhar:
R-634 Model Town; Kapurthala: Mohalla
Paramjit Ganj; Ludhiana: Kothi No 5,
Model Gram; Patiala: Akal Sahai Bldg,
Behind Main Post Office; Ropar: Hindu
Public School Rd, Granthi Bagh; Sangrur:
Kular Cottage, Mohalla Mubrak Kothi.

ANIMAL HUSBANDRY DEPARTMENT, 17 Bays Bldg,
Sector 17, Chandigarh 160017; Ph: 24409,
Gram: Husbandry.

Dir: L S Toor, Ph: 24409

Jt Dir (Feed & Fodder): Makhan Singh,
Ph: 21797

Dep Dir (MFALA): Dr Amar Singh, Ph: 28578

Dep Dir (AP): Dr M L Kaushal, Ph: 21368

Dep Dir (AH): Dr A S Narula, Ph: 31174

Dep Dir (Statistics): Pt Sudarshan Kumar,
Ph: 28509

Dep Dirs (AH) -- Amritsar: Dr H S Nat, Ph:
41961; Bathinda: Dr M S Nandpuri, Ph:
2906; Faridkot: Dr Shavinder Singh, Ph:
676; Ferozpur: Dr Tirath Singh, Ph:
2841; Gurdaspur: Dr N S Grewal, Ph: 377;
Hoshiarpur: Dr D P Sharma, Ph: 2774;
Jalandhar: Dr R S Bagga, Ph: 77337;
Ludhiana: Vacant, Ph: 21095; Pati-
ala: Dr G S Sohi, Ph: 74130; Sangrur:
Dr A S Tur, Ph: 293.

Asst Dirs (Anim Prod/Anim Health) -- Amrit-
sar: Dr Inderjit Singh/Dr Sushil Rattan;
Bathinda: Dr Pajguru Joshi/Vacant; Farid-
kot: Dr Bachitar Singh/Vacant; Ferozpur:
Dr Kaur Singh/Dr O P Monga; Gurdaspur:
Dr K K Bhalla/Vacant; Hoshiarpur: Dr
Amrit Lal/Dr Devinder Singh; Jalandhar:
Dr Karnail Singh/Dr R K Moria; Kapur-
thala: Dr M S Saini/Dr Devinder Singh;
Ludhiana: Dr Harnek Singh/Dr D S Bhatia;
Patiala: Dr H S Kang/Dr Harsurat Singh;
Ropar: Dr Sushil Kumar/Dr S L Sharma;
Sangrur: Dr V K Kataria/Dr O S Kalra.

Sr Vet Offrs -- Amritsar Dist -- Anjala:
Vacant; Amritsar: Dr R L Randhi; Baba
Bakala: Dr Partap Singh; Patti: Dr R S
Bedi; Tarn Taran: Dr Gurmeet Singh;
Bathinda Dist -- Bathinda: Dr Om Parkash;
Mansa: Dr Bhan Singh; Rampura Phool:

Dr Amarjeet Singh; Talwandi Sabbo: Dr R
S Sodhi; Faridkot Dist -- Moga: Dr M S
Bansal; Mukhtsar: Dr Gurmail Singh;
Ferozpur Dist -- Fazilka: Dr Din Dyal;
Ferozpur: Dr J S Talwar; Zira: Dr Avtar
Singh Zira; Gurdaspur Dist -- Batala:
Dr Gurmikh Singh; Pathankot: Vacant;
Hoshiarpur Dist -- Balachor: Dr Vachnav
Kumar; Dasuya: Dr Mohan Singh; Ghar
Shankar: Dr A K Oberai; Jalandhar Dist
-- Jalandhar: Dr Baldev Singh; Nakodar:
Dr Piara Singh; Nawan Shahar: Dr Sham
Sunder; Phillior: Dr J S Virk; Kapur-
thala Dist -- Kapurthala: Dr Satwinder
Singh; Phagwara: Dr Swantantra Singh;
Sultanpur Lodhi: Dr H S Malhi; Ludhiana
Dist -- Jagraon: Ramesh Prashar; Khanna:
Dr Dev Singh; Ludhiana: Dr Narmal Singh;
Samarala: Dr Darshan Singh; Patiala Dist
-- Bassi Pathana: Dr Jaswant Singh;
Nabha: Dr P K Gupta; Patiala: Dr Ranbir
Singh; Rajpura: Dr Raghbir Singh; Smana:
Dr K L Mittal; Ropar Dist -- Anandpur
Sahib: Dr Jai Krishan; Kharar: Dr Jasbir
Singh; Ropar: Dr Ram Singh; Sangrur Dist
Barnala: Dr J S Bawa; Malerkotla: Dr Mal
Singh Bedi; Sangrur: Dr C S Cheema;
Sunam: Dr Nirver Singh.

Rajasthan

Area: 342,239 sq km Population: 34,261,862

Capital: JAIPUR

Cows: 13,466,000 Buffaloes: 6,035,000

Annual Milk Production: 3,800,000 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Saras
Sankul, Malviya Nagar Rd, Jaipur 302017;
Ph: 77984, 74291, Gram: Veterinary.

Dir: T R Verma, IAS, Ph off: 74291,
resi: 63039

Jt Dir (Admn): Dr D S Bhandari, Ph off:
77984, resi: 46847

Jt Dir (Proj): Dr R R Kalla, Ph off: 77984,
resi: 60013

Jt Dir (BP Lab): Dr V R Ambwani, Ph off:
62171, resi: 72204

Dep Dir (KVS): Dr M K Bhattacharya,
Ph off: 69283, resi: 78900

Dep Dir (Plg): Dr R R Batta, Ph off: 77984,
resi: 42813

Dep Dir (Epidemiology): Dr H K Sharma

Dep Dir (Anim Prod): Dr P V Rao
 Geneticist: Dr B S Malik
 Asst Dir (Plg): Dr K C Kaushik
 Asst Dir (Statistics): P N Tiwari
 Asst Dir (RP): Dr B S Gaur, Ph: 69283
 Asst Dir (Fodder Prod): Dr S P Purohit,
 Ph: 69283
 Asst Dir (Inservice Trg Prog): Dr B K Tak,
 Ph off: 73237, resi: 69439
 Asst Dir (Radiology): Dr S D Sharma,
 Ph: 73237
 Pathologist (DD): Dr A K Purohit
 Sire Evaluation Offr: Dr S C Bhatnagar,
 Ph: 69283
 Feed & Fodder Offr: Dr J P Mittal, Ph: 69283
 Regl Field Pub Offr: Dr P R Mehta
 Disease Investigation Offr (Cattle): Dr R
 G Sharma
 Nutritionist (DD): Dr S R Maheshwari
 Dep Dirs — Bikaner Range: Dr K N Purohit;
Jaipur Range: Dr D P Singh; Jodhpur
Range: Dr S N Thapar; Kota Range: Dr B L
 Midha; Udaipur Range: Dr M L Rai.
 Dist AH Offrs — Ajmer: Dr A Ramnani, Ph:
 21640; Alwar: Dr C B Raodeo, Ph: 2341;
Anoopgarh: Dr H B Bajaj; Banswara: Dr M
 M L Sharma; Barmer: Dr S C Ghosh, Ph:
 284; Bharatpur: Dr Y V Satyanarayan;
Bhilwara: Dr V P Bhargava, Ph: 244;
Bikaner: Dr R R Kulkarni; Bundi: Dr T N
 Saxena; Chittorgarh: Dr K B Sharma, Ph:
 408; Churu: Dr R C Mathur; Dausa: Dr
 Abhaya Singh; Dholpur: Dr B S Mann;
Dungarpur: Dr M K Nanavati, Ph: 356;
Ganganagar: Dr R S Karwasra; Jaiselmer:
 Dr K C Joshi; Jalore: Dr P C Mohta;
Jodhpur: Dr J L Mathur, Ph: 20248;
Jhalawar: Dr P P Mathur; Jhunjhunu: Dr
 Srikanth Rao; Kota: Dr M S Tanwar, Ph:
 4156; Nagour: Dr A A Baig, Ph: 351;
Pali: Dr Altaf Ahmed, Ph: 7227; Rajsa-
mand: Dr M D Bohra; Sawai Madhopur: Dr
 A P Gupta; Sikar: Dr A K Joshi; Sirohi:
 Dr V R Joshi, Ph: 161; Tonk: Dr P N
 Mathur; Udaipur: Vacant, Ph: 3408.
 Key Vill Centres — Abu Rd (Sirohi); Anoop-
 garh (Sri Ganganagar); Balotra (Barmer);
 Banswara; Bharatpur; Bikaner; Bundi;
 Chittorgarh; Dhariawad (Udaipur); Jhala-
 war, Jodhpur; Kota; Mandalgarh (Bhil-
 wara); Nagour; Pali; Pratapgarh (Chit-
 torgarh); Rajsamand; Rawatsar (Sri
 Ganganagar); Sagwara (Dungarpur); Salum-
 ber (Udaipur); Sikar; Suratgarh (Sri
 Ganganagar); Udaipur.
 Project Offr (DD), Indo-Swiss Goat Project,
 Ramsar, Ajmer Dist — Dr J K Verma.

Sikkim

Area: 7,096 sq km Population: 316,385
 Capital: GANGTOK
 Cows: 172,000 Buffaloes: 4,000
 Annual Milk Production: 23,000 tonnes

DEPARTMENT OF ANIMAL HUSBANDRY, Lower Secre-
 tariat, National Highway, Gangtok 737101;
 Ph: 2504.

Secretary: Dr B S Basnet, Ph off: 2503,
 resi: 2324

Dir: Dr N T Lepcha, Ph: 2504

Addl Dir (AH): S Paljor, Ph: 2504

Addl Dir (VS): Dr M M Goley, Ph: 2498

Addl Dir (C&D): Dr P P Sharma, Ph: 2506

Jt Dir (VS): Dr N D Lama, Ph: 2554

Dairy Dev Offr: A Jawa, Ph: 2506

SIKKIM LIVESTOCK DEVELOPMENT CORPORATION
 LTD, Poshtik House, Tadong, Gangtok
 737102; Ph: 2684; Mg Dir: Sonam Gyatso.

Tamil Nadu

Area: 130,058 sq km Population: 48,408,077
 Capital: MADRAS
 Cows: 10,247,000 Buffaloes: 3,207,000
 Annual Milk Production: 3,100,000 tonnes

ANIMAL HUSBANDRY DEPARTMENT, Central Office
 Bldg (Block II), Greaves Rd PO, Madras
 600006; Ph: 450170, Gram: Tibizatum.

Dir: Dr C K Kalyanasundaram,
 Ph off: 454215

Addl Dir (Plg & Admn): Dr A Balaguru,
 Ph: 450170 Ext 53, resi: 613348

Addl Dir (SAHP): Dr M S Mani, Ph: 450170
 Ext 55

Jt Dir (Statistics): Dr T K Govindarajan,
 Ph: 450170 Ext 60

Jt Dir (Planning): Vacant, Ph: 450170 Ext 94

Jt Dir (Propaganda & Pub): Vacant, Ph:
 450170 Ext 94

Dep Dir (Surveillance): Dr V S Gajapathy,
Ph: 450170 Ext 65

Dep Dir (Sample Survey): Dr D Balasubramanian, Ph: 450170 Ext 100

Asst Dirs (Statistics): Dr D Subramania Reddy, Dr P J Soundarajan

Asst Dir (Surveillance): Dr Samuel Rajasingam

Asst Dir (Sample Survey): Dr D Ebinezer,
Ph: 450170 Ext 100

Rinderpest Offr: Dr S Kumarasamy,
Ph: 450170 Ext 63

Regl Offices — Regl Jt Dirs — Coimbatore: 122/123 Lakshmi Bldgs, Diwan Bhahadur Rd, -641002; Dr M Ramakrishna Singh, Ph: 30247; Cuddalore: 11 Mariasoosai Nagar; Dr R K Raman, Ph: 1048; Dindigul: 8-9 Chellandiamman Koil St, -624010; Dr G Muthubabu; Kancheepuram: 16 Munusami Mudaliar St, -631501; Dr V Gnanamurthy, Ph: 3209; Madurai: 13-A Kanga Apts, 1st Floor, Lady Doci College Rd, -625002; Dr S K Kalimuthu, Ph: 42801; Ramanathapuram: 1 Bhanamathu Nachier Rd, North St, -623501; Dr A Ramasamy; Salem: 120 Bruds Rd, -636001; Dr K Venkatarajulu, Ph: 65721; Sivaganga: Dr Thiruganasambandam (Addl Charge), Ph: 215; Thanjavur: Old Palace Bldgs, East Main St, -613001; Dr R G Santhanakrishnan, Ph: 835; Tiruchirapalli: 3 Aandipattu Bunglow Upstairs, Dindigul Rd, Trichy 620001; Dr M Jayaseelan, Ph: 29308; Tirunelveli: 210-A Samathempuram, -627002; Dr R Natarajan, Ph: 5008; Vellore: 80, 12th East Cross Rd, Gandhi Nagar, -632006; Dr L Ramachandran, Ph: 20918; Virudhunagar: Dr S K Kalimuthu (Addl Charge), Ph: 4706.

Dist AH Offices — Ambasamudram; Aranthanki; Ariyalur; Arni; Avinashi; Chidambaram; Chingleput; Chitlapakkam; Coimbatore; Dharapuram; Dharamapuri; Dindigul; Erode; Gobichettipalayam; Hosur; Kallakurichi; Kancheepuram; Karaikudi; Karur; Kodaikanal; Kovilpatti; Kumbakonam; Madurai; Madurandakam; Mannargudi; Melur; Musiri; Nagapattinam; Nagercoil; Namakkal; Omalur; Palaru; Paramakudi; Pattukottai; Pollachi; Ponneri; Poonamallee; Ramanathapuram; Ranipet; Saidapet (Madras); Sivaganga; Srivilliputtur; Thanjavur; Thuckalay; Tindivanam; Tirunelveli; Trichy; Tuticorin; Udumalpet; Uthagamandalam; Virudhunagar; Villupuram.

Intensive Cattle Development Projects (ICDP) — Chidambaram; Madurai; Panruti; Pudukkottai; Tambaram; Thanjavur; Tirunelveli; Trichy; Udumalpet; Usilapatti; Vadipatti.

Key Vill Block Schemes — Dindigul; Mannargudi; Nagercoil; Ramanathapuram; Sivaganga; Tirunelveli; Trichy; Theni.

Regl AI Centres — Coimbatore Dist: Madathukulam; Vettaikaranpatti; Kamarajar Dist: Srivilliputhur; Virudhunagar; Madurai Dist: Alanganallur; Adipatti; Madurai; Melur; Natham; Uslampatti; Pudukkottai Dist: Keeranur; Pudukkottai; South Arcot Dist: Bhuvanagiri; Cuddalore; Kattumannarkoil; Panrutti; Thanjavur Dist: Orathanad; Thiruvaiyaru; Tirunelveli Dist: Cheranmadevi, Tuticorin; Trichy Dist: Lalgudi; Trichy.

DAIRY DEVELOPMENT DEPARTMENT, Office of the Milk Commissioner for Milk Production and Dairy Development Dept, Milk Colony, Madhavaram, Madras 600051; Ph: 575193-98, Gram: Palvalam.

Commissr: V Karuppan, IAS, Ph (resi): 413097
Dep Milk Commissr (Cooperation): H Dhanraj
Project Mgr (Admn): R Seetharaman

Regl Officers — Deputy Registrars (Dairying) — Coimbatore: M Swamidas, 6-B North South St, 4 Muthusamy Colony, Kumarpalayam PO, -641026; Cuddalore: A V Lakshmanan, 66 Subbarayalu Nagar, Thirupadurapuliur, -607002; Ph: 612; Dharmapuri: M Sheik Dawood, 25 & 26 Mariamman Koil St, Kumarasamy PO, -636703; Ph: 6430; Dindugal: K Marudan, Plot No 52, Anna Nagar, Dindugal, Anna Dist; Erode: N Paramasivam, 21 Srinivasa St, Kallukadai Medu, -638002; Ph: 79131; Kancheepuram: N Sen thilnathan, 11 D Yadothkara North Mada St, -631501; Ph: 2440; Madurai: A Hariharan, 7 Jawagar St, Gandhi Nagar, -625020; Ph: 43729; Manamadurai: M Chokkalingam, No 24 Gundurayar St, -623606; Nagercoil: B Patrick Thomas Durairaj, 10 Pattison St, -629001; Pudukkottai: A Duraisamy, T S No 1003, North 3rd St, Pudukkottai; Salem: M Sheik Dawood, Plot 12, 8A Subbaraya Mudaliyar Layout, Hasthampatty, -636007; Ph: 64562; Thanjavur: P James Percy Rajkumar, 24-B 7th St, Arulanandha Nagar, -613007; Tirunelveli: K R Swaminathan, 79 Salai St, Vanarpet, -627003; Ph: 25736; Trichy: V Kasilingam, 3 Warners Rd, Cantonment, -620001; Ph: 23860; Proj Offr: J Sivaraman; Udagamandalam: T Gopinathan, Ettinen Rd, -643001; Vellore: K Varadharajan, 1/2 Masilamani Mudali Hostel St, -632001; Ph: 22018; Virudunagar: P K Padmanabam, 13, T S Kittangi St, Virudunagar; Ph: 3348.

Tripura

Area: 10,486 sq km Population: 2,053,058

Capital: AGARTALA

Cows: 680,000 Buffaloes: 16,000

Annual Milk Production: 24,500 tonnes

DIRECTORATE OF ANIMAL HUSBANDRY, Astabal,
Agartala 799001; Ph: 3528, Gram: Chiefvet.

Dir: Dr J L Kar, Ph: 3611

Jt Dir (AH): Dr M K Debbarman, Ph: 5118

Dep Dir (AH): Dr S C Sarkar, Ph: 3528

Dep Dir (RE): Dr A K Mazumder, Ph: 3528

Dep Dir (HQ): Dr S C Roy, Ph: 3528

Dep Dir (Dairy): M L Chakraborty, Ph: 3528

Dep Dir (Fodder): A C Debnath, Ph: 3528

Dep Dir (South), Udaipur: Dr S P Debnath,
Ph: 374

Dep Dir (North), Kailashahar: Dr G B
Chowdhury, Ph: 42

Dep Dir (West), Kunjaban: Dr N C Roy, Ph: 4394

Dep Dir (FC), Radhakishorenagar: Dr R C
Bhattacharjee, Ph: 4583

Dep Dir (RGHF), Debipur: Dr S Banerjee,
Ph: 6004

Dairy Mgr: N C Nag, Ph: 3528

Proj Offr (ICDP-II), Kailashahar: Dr R N
Gupta, Ph: 42.

Uttar Pradesh

Area: 294,411 sq km Population: 110,862,013

Capital: LUCKNOW

Cows: 26,151,000 Buffaloes: 15,784,000

Annual Milk Production: 7,727,000 tonnes

MILK COMMISSIONER'S OFFICE, Dairy Dev Dept,
Jawahar Bhawan, 3rd Floor, North Wing,
Ashok Marg, Lucknow.

Milk Commisr: V K Sharma, IAS, Ph off:
42869, resi: 43693

Addl Milk Commisr: K L Sharma, Ph: 43641

Dairy Engr: S S Sharma, Ph: 34464

Dep Milk Commisr: Pancham Lal, Ph: 34464

Dairy Dev Offrs (HQ): K N Shrivastav, Ram

Janam Singh, Ph: 33873

Dep Sec (Milk Board): B M Mishra,
Ph: 34460

Statistician: Vidya Sagar

Dep Dairy Dev Offrs: Sita Ram Pandey, M K
Shrivastava, Ph: 33851

Regl Dairy Dev Offrs -- Bareilly Region:

V K Trivedi; Gorakhpur Region: Dr R S

Kushwaha; Lucknow Region: Jagpal Singh;

Varanasi Region: R S Singh.

Regl Deputy Dairy Dev Offrs -- Agra: Ram-

eshwar Dayal; Aligarh: A C Mishra;

Allahabad: J S Mehta; Almora: A K Singh;

Azamgarh: J P Chaturvedi; Banda: K K

Dwivedi; Bareilly: A K Gupta; Bijnore:

O P Garg; Bulandshahr: Tilak Singh;

Dehradun: S K Bharti; Etah: J C Sharma;

Faizabad: Rameshwar Rai; Farukhabad:

Ved Pal Singh; Ghaziabad: Dr M P Singh;

Gorakhpur: B P Gupta; Hamirpur: Sobran

Singh; Jalaun: S B L Mathur; Jaunpur:

Purshottam Mishra; Kanpur: P L Srivas-

tava; Mathura: V M Lal; Meerut: Siva-

saran Singh; Moradabad: G S Kabira;

Muzaffarnagar: Jagdish Singh; Nainital:

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Mishri Lal; Shahjahanpur: Kunwar Baha-

dur; Sitapur: Ramraj Singh; Sultanpur:

Vacant; Unnao: T P Gupta.

ANIMAL HUSBANDRY DEPARTMENT, Gokaran Nath
Rd, Badshahbagh, Lucknow 226007; Ph:
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Dir: Dr Ram Janam Singh, Ph off: 74857,
resi: 71328

Addl Dir (Hills), Gopeshwar, Chamoli Dist:
Dr V P Gupta

Addl Dir (Plg): Vacant,
Ph off: 75130

Addl Dir (Cattle Breeding): Dr V S Srivas-
tava, Ph off: 74852, resi: 74212

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West Bengal

Area: 88,752 sq km Population: 54,580,647

Capital: CALCUTTA

Cows: 15,649,000 Buffaloes: 986,000

Annual Milk Production: 2,610,000 tonnes

OFFICE OF THE MILK COMMISSIONER, Directorate of Dairy Development, Govt of West Bengal, 23-A Netaji Subhas Rd, 9th Floor, Calcutta 700001; Ph: 204535, 204536, Gram: Dairycal.

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Addl Milk Commissr: K K Ghosal, Central Dairy, 64/99 Belgachia Rd, Calcutta 700037; Ph: 528081, 528181

Addl Milk Commissr (Proj): D Ghosh, 23-A Netaji Subhash Rd, Calcutta 700001; Ph: 204535

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Dep Milk Commissr (Haringhata): Vacant, Ph: 623, 430, 432 (Kalyani Ex)

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Agril Economist: S K Bose

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Dairy Mgr (Burdwan): B Das

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Proj Offr (Krishnagar): R C Kansabanik

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Addl Dir (HQ): Dr S K Moulick, Ph off: 255601, 253371 Ext 538, resi: 492895

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Spl Offr (AH): Dr (Capt) M Ahmed, Ph off: 221681 Ext 461

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Ph off: 255601, 253371 Ext 548

Supdt of Livestock (Mktg): Dr S R Das Majumdar, Ph off: 255601, 253371 Ext 525

Supdt of Livestock (ITDP): Dr S K Bhanja, Ph off: 255601, 253371 Ext 539

Fodder Dev Offr: T K Prodhon, Ph off: 255601, 253371 Ext 525

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Statistical Offr: M K Samanta

Mktg Inspectors: A K Dutta, N K Laha

Special Offr (Feed): A R Dey

Extn Offr (AH): J K Chakraborty

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A K Mondal, Ph: 629; Mohanbati (Raiganj): Dist West Dinajpur; Vacant, Ph: 328 (Raiganj); Murshidabad: Central Semen Collection Station, PO Beldanga, Dist Murshidabad; Dr H Hogue, Ph: 79 (Beldanga); Nadia: 3/1, R K Mitra Lane, Swarnamoyee Tank, Krishnagar; Dr S Ghosh Roy, Ph: 2725; Narendrapur: R K Mission Ashram, Dist 24-Parganas (South); Dr N Dutta; Purulia: Dr R N Adhikari, Ph: 561; Siliguri: Deshbandhupura, Near SSB Off, PO Siliguri; N C Bose, Ph: 22817.

District Livestock Offrs -- Bankura: School-danga; Dr L K Dey, Ph: 463; Birbhum: PO Suri; Dr K Saha, Ph: 426; Cooch Behar: Panthasala Rd (Near Circuit House), PO & Dist Cooch Behar; P Sanyal, Ph: 676; Darjeeling: AH Complex, Dugra, PO Kalimpong, Dist Darjeeling; N Norbu, Ph: 530; Howrah: 82 Joy Narayan Santra Lane; Dr S N Mitra; Malda: Mukdumpur; T K Roy, Ph: 2147; Purulia: Nilkuthidanga, PO & Dist Purulia; Dr C D Banerjee, Ph: 742.

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Dir: Dr P B Kundu, Ph off: 285545, resi: 574383

Addl Dir: Dr A C Saha, Ph off: 286271 Ext 81
Jt Dir: Dr B N De, Ph off: 286271 Ext 60, resi: 575470

Dep Dir (DP Cell): Dr B T Banerjee, Ph off: 286271 Ext 328

Supdt of Vet Services, HQ: Dr S K Basu,

Ph off: 286271 Ext 332, resi: 641030
Sr Vet Surgeon (Publicity) HQ: Dr P G Banerjee

Disease Investigation-cum-Clinical Lab, Darjeeling, Res Offr: Dr J Samaddar
Dep Dirs -- Presidency Div: Administrative Bldg, PO Kalyani, Nadia Dist; Dr (Capt) C R Acharya, Ph: 221 (Kalyani); Burdwan Div: Dr K Chakraborty, Ph: 2284 (Burdwan); Jalpaiguri Div: PO Siliguri, Darjeeling Dist; Dr M B Barailly, Ph: 223555 (Siliguri).

Disease Investigation Offr: Dr P K Biswas, B V College Campus, 37 Belgachia Rd, Calcutta 700037; Ph: 527687.

Dist Vet Offrs -- Bankura 722101: Dr K Dutta, Ph: 282; Birbhum, PO Suri 731101: Dr D Sen, Ph: 252 (Suri); Burdwan 713101: Dr C R Banerjee, Ph: 2284; Cooch Behar 736101: Dr A Bose, Ph: 504; Darjeeling 734101: Dr P K Biswas, Ph: 2482; Dinajpur (West), PO Balurghat 733101: Dr S K Manati, Ph: 279 (Balurghat); Hooghly, PO Chinsurah 712100: Dr K Dutta Chowdhury, Ph: 272 (Chinsurah); Howrah: 2 Joynarayan Santra Lane, -711101; Dr S R De, Ph: 674205; Jalpaiguri 785101: Dr A K Saha, Ph: 758; Malda 732101: Dr A K Saha, Ph: 2407; Midnapore (North): Dr M Mukherjee, Ph: 526; Midnapore (South), PO Contai 734001: Dr Santosh Sen, Ph: 141 (Contai); Murshidabad, PO Berhampur 742101: Dr B Mazumdar, Ph: 671 (Berhampur); Nadia, PO Krishnagar 741101: Dr (Capt) C R Acharya, Ph: 374 (Krishnagar); Purulia: Dr T K Poddar, Ph: 514; 24-Parganas (North), PO Barasat 743201: Dr N Chakraborty, Ph: 617606; 24-Parganas (South): B V College Campus, 37 Belgachia Rd, Calcutta 700037; Dr M K Chakraborty.

Semen Collection Stations -- Alipurduar, Balarampur, Baligori, Balurghat, Beldanga, Bethuadahari, Burdwan, Chinsurah, Cooch Behar, Duswrath, Gobordanga, Haringhata (Mohanpur), Jhargram, Kaliachak, Kalীগanj, Kalimpong, Kuresong, Malda, Mathabhanga, Midnapore, Moynagiri, Narendrapur, Purulia, Ranjitpur, Samsi, Satgachi, Suri, Tamruk, Vishnupur.

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Avadi, Alamadhi, Madras 600052
Breed: Murrah Buffaloes ● Annual Capacity: 84

Central Cattle Breeding Farm
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Breed: Tharparkar Cattle ● Annual Capacity: 84

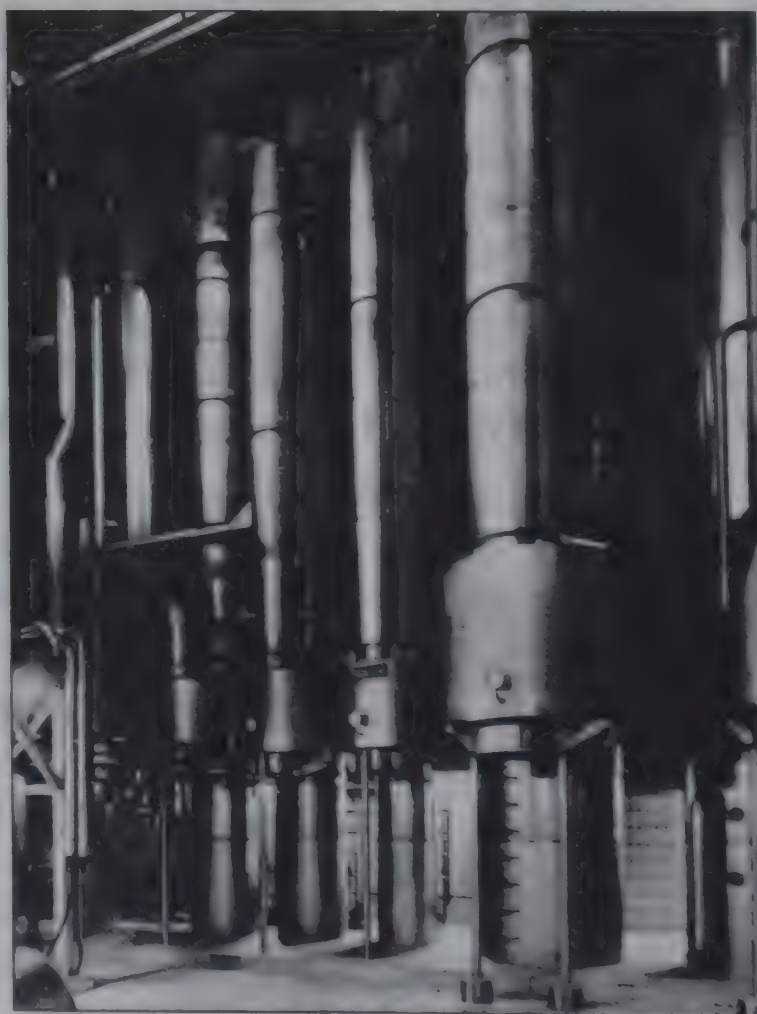
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Dairy India 1987

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679 Who's Who

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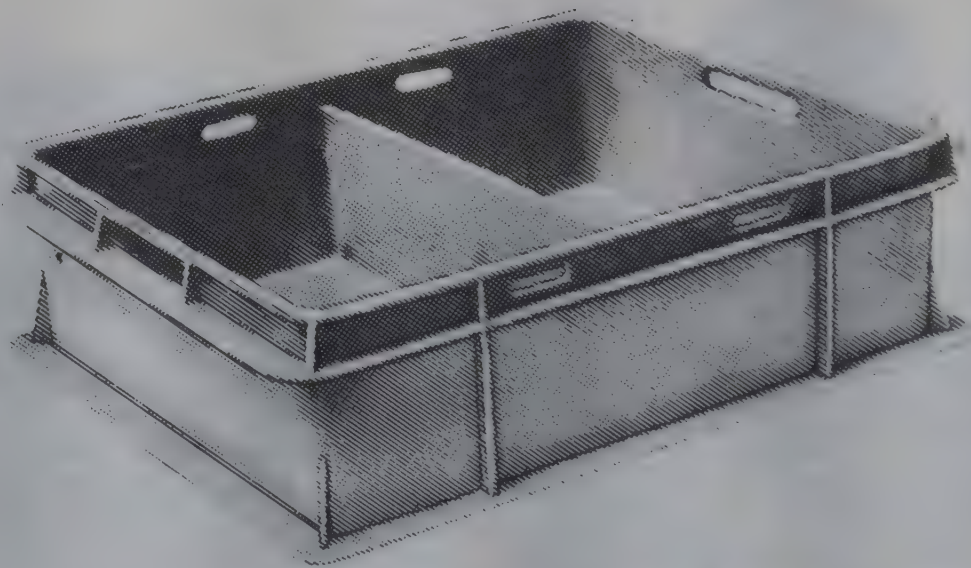
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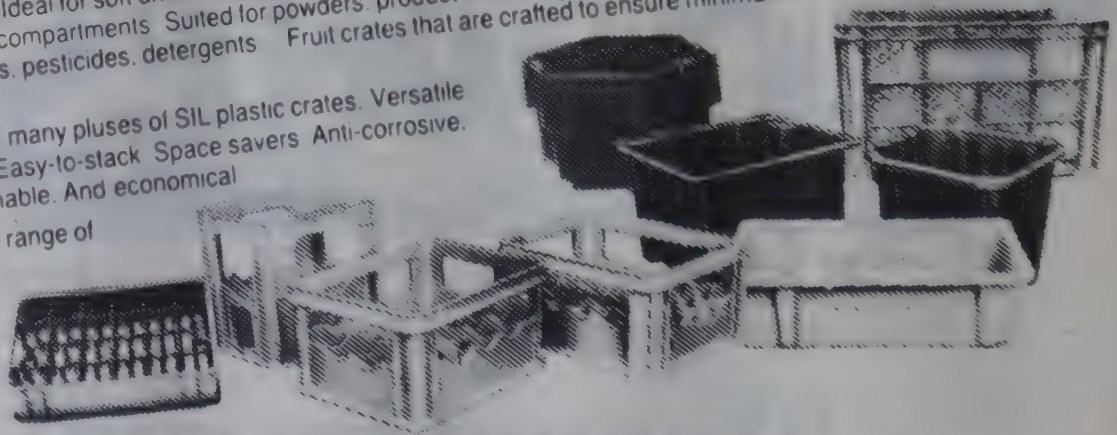
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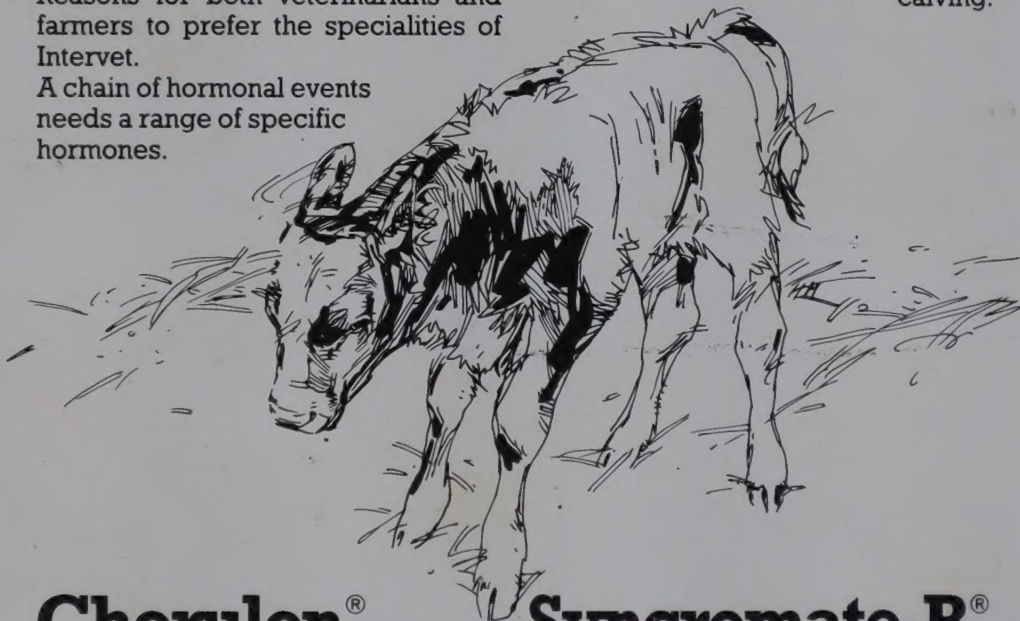
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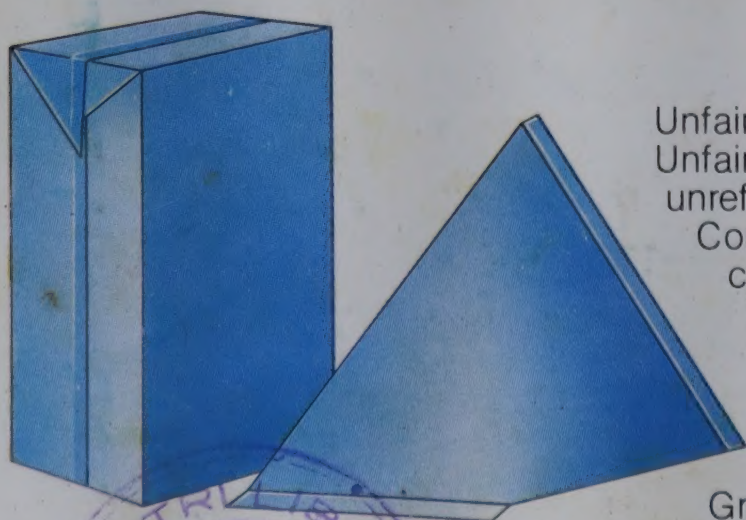
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